

JPRS-EST-93-022

15 July 1993



JPRS Report

Science & Technology

***Europe/International
Economic Competitiveness***

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Economic Competitiveness

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SCIENCE & TECHNOLOGY POLICY

German Efforts to Privatize Chemical Industry Discussed

93WS0430A Duesseldorf VDI NACHRICHTEN
in German 9 Apr 93 p 3

[Article by Oliver Fischer and Manfred Schulze under the rubric "This Week": "Privatization of the Eastern German Chemical Industry Progressing Only Slowly. Too Big, Too Worn Out. Reconstruction Companies Will Be Founded for Several Hundred Million German Marks [DM]"; first paragraph is an introduction]

[Text] Leipzig/Berlin, 9 Apr 93 (VDI-N)—Most eastern German chemical plants have still not been sold even three years after reunification. Meanwhile the employment figures are dropping still further. Seventeen thousand employees are now to be employed in reconstruction companies. The industrial park coming into being in Bitterfeld also promises hope.

Privatization successes have thus far hardly been granted to the eastern German chemical industry. Though whispered names of potential buyers like Italian Enichem or Austrian OMV, for example, are being brought into play again and again with certain regularity, nevertheless successes have been rare, even if the sale of the Piesteritz nitrogen plant was able to be reported recently, or the privatization of the amine division of Leuna is expected in April.

The time is long past when enterprises like Leuna can be privatized without being split up, as the trust believed. Investors are being scared away: The operations are too big and the plants too worn out. There are possibly also as yet unknown abandoned polluted areas at the site of the operation. In addition there is the world economic crisis in the chemical industry—companies have to be more frugal in placing orders. The chances are not good that the federal government will declare that it is willing to preserve at all costs such industrial centers like Leuna, Buna and Bitterfeld.

Now the trust establishment and IG Chemie-Papier-Keramik [Chemicals, Paper and Ceramics Workers' Union] in Berlin have signed a general agreement that is to avert the worst social consequences. According to it, any employee threatened with permanent layoff from one of the 10 trust enterprises of the big chemical industry is receiving since the beginning of April an offer of employment in reconstruction companies according to paragraph 249h of the Labor Promotion Law. The job of the newly founded companies is to be first of all the clean-up of abandoned polluted areas. Participation in qualification measures, whose subject matter is to conform to the requirements of future investors, is planned for around one-fifth of the workforce to be taken in. IG Chemie and the trust will found a "Chemical Industry Qualification Facility" that will coordinate the qualification offerings.

Around 17,000 employees are affected by the provision, IG Chemie President Hermann Rappe said on the occasion of the signing. They include 12,000 employees that will be laid off this year yet, and 5000 ABM [job-creation measure] workers whose provisions run out in 1993. The compensation of employees working in the reconstruction companies will be regulated by a collective agreement that guarantees the employees 90 percent of their previous net compensation.

The reconstruction company will be financed from the Federal Labor Office's funds. The states of Saxony and Saxony-Anhalt will assume a quarter, and the trust three quarters, of the cost for large-scale projects. According to trust Director of Personnel Fohr, costs to the tune of 300 million to 500 million German marks [DM] will arise this year. The mean requirement will be from DM500 million to DM700 million for 1994.

The Eastern German chemical plants have had to slim down already to date. More than half of all jobs have been cut at the large Eastern German chemical plants within three years. Of the at one time 27,000 employees in Leuna, 7,900 still have their jobs, and of the 18,000 in Buna, 6,700. Just under 10,000 would be able to have made it in hived-off enterprises.

Buna AG [German Stock Corporation], for example, is doing deplorable business three years after the monetary union. A loss of DM370 million appeared on the books in 1992 with sales of still just DM750 million. The company, which makes surfactants, softeners, polystyrene and polyethylene, faces drastic treatment.

The personnel cutting plan arranged with the employee councils has already been outpaced by the crippling economic situation. Now the level of 4,700 employees aimed at for 1995 is to be reached already very soon in Buna. Though the employee council was able to push through working on short time once to begin with, nevertheless Personnel Manager Dr. Christoph Muhlhaus sees no chance of "at least 1400 employees" holding their jobs.

Board member Volkmar Gropp expects for the current business year "once more a markedly poorer result" for sales than there already has been. Leuna's and Bitterfeld's losses are in a similar range. There are hardly any alternatives: Outside the chemical industry there are hardly big employers in the Halle area.

Privatization has also stagnated at the Leuna site, although the sale of the refinery to a French-German consortium led by Elf Aquitaine was celebrated grandly last year. But after this nothing happened for a long time. According to information from IG Chemie President Hermann Rappe, negotiations are already under way through the chemical businesses "behind the refinery" with Elf Aquitaine subsidiary Atochem, the Italian Eni Group and Austrian OMV. Rappe hopes that Western German companies will also be interested more strongly in Leuna after the cornerstone is laid for the new refinery.

Western German companies are already committing themselves in Bitterfeld—Bayer, for instance, that is investing DM750 million there. This is to provide 750 jobs.

The "Bitterfeld Chemical Park" is coming into being there on a total area of six square kilometers. This is an industrial center oriented toward chemical products as its focus, at which thus far 121 investors and providers of a livelihood from every sector of the economy have set up shop and have created 2600 new jobs. A total of over 5000 permanent jobs can be counted on.

Chemie AG from Bitterfeld, once a chemical combine with 15,000 employees that has shrunk by more than half today, can also profit from this. But here, too, only a few product lines like PVC production, for instance, will be able to survive. The bread-and-butter lines are to be maintained for the present under the trust's ownership, even if the losses are high and the investment is huge.

The site of Chemie AG in Bitterfeld has by no means been affected by abandoned polluted areas throughout. "Just" a third is heavily polluted, the detailed fact-finding reports state, which have been worked on intensively since 1990 under contract from the Federal Ministry of the Environment. Another third can be cleaned up at justifiable expense for renewed industrial use, it is said. The rest of the area is no more heavily polluted than in any other intact industrial area in Germany. But thus far this does not appear to be persuading investors greatly. They are holding back in spite of qualified personnel and "greater acceptance for the chemical industry," as the managing board puts it again and all over again.

Germany: Research Ministry Adds Three New Topics to Climate Program

*MI0806125093 Bonn TECHNOLOGIE-NACHRICHTEN
MANAGEMENT-INFORMATIONEN in German
16 Apr 93 pp 4-5*

[Text] Information on future climatic developments on a global and regional scale is the topic of the climate research being funded by the BMFT [Federal Ministry of Research and Technology]. Three new areas of emphasis have now been announced. The BMFT will provide about 50 million German marks [DM] for this purpose from 1994 to 1996. The general topics are:

- the hydrological cycle;
- climatic variability and signal analysis;
- trace element cycles.

Under the "hydrological cycle" funding topic, funding will be given primarily to projects that promise a distinct improvement in the representation of the processes that control the formulation of the hydrological cycle in climatic models. The reason is that, in addition to changes in temperature, it is primarily changes to the

hydrological cycle that directly affect the future basis of man's livelihood via agriculture and forestry, water supplies, industry, and tourism.

German contributions to international research work are also to be funded under the "hydrological cycle" topic. These research projects are primarily engaged in modeling global changes, thereby having the same objectives as the federal government's funding program.

The "climatic variability and signal analysis" area will:

- Set up a joint German climatic research data collection in the form of an actual data base with observation data and model data;
- Analyse natural climatic fluctuations on a global and regional scale;
- Perform model calculations with a view to determining the anticipated climatic changes resulting from external influences, either natural or anthropogenic;
- Develop signal recognition methods and apply them to observation data and model simulations.

The work carried out under "trace element cycles" will be used for the quantitative recording of biogeochemical cycles of the trace gases methane, nitrous oxide, and volatile hydrocarbons. Finally, the feedback loops between climatic changes and the atmospheric cycles of the above trace gases, and the sources and sinks of carbon dioxide, are to be studied.

In the first instance, the general topics are broadly structured. Scientists are invited to submit outline ideas/projects between now and the end of April. The subsequent procedure will be devoted to defining major fields and setting priorities that will make it possible contribute at the national level to international research programs.

The general aim of the climatic research funded by the BMFT continues to be obtaining reliable information on future climatic development on a global and regional scale. For this purpose, a comprehensive evaluation of the condition of the climatic system is to be undertaken, and a better understanding of the underlying processes and interactions is to be achieved. A considerable amount of research is required into the effects of anthropogenic climatic change.

Further information is obtainable from Dr. Gast or Dr. Oedekoven, BMFT Project Managers, Kuehbachstrasse 11, D-W-8000 Munich 90, tel. 089/651088-42 or -57, fax 089/65108844.

Germany: Ministry Reviews Environment Research Policy

MI0306083493 Bonn *TECHNOLOGIE-NACHRICHTEN*
MANAGEMENT-INFORMATIONEN in German
16 Apr 93 pp 2-3

[Text] The BMFT [Federal Ministry of Research and Technology] is currently examining in what way research and development projects could contribute specific solutions to current and possible future environmental problems. It is working together with the national research institutes on a strategy that will set new priorities and areas of emphasis, with the aim of bringing together existing knowledge on the environment as a system and the environmental problem-solving technologies. This involves:

- Determining the causes of environmental pollution and damage;
- Acquiring comprehensive knowledge of stability conditions and pollution limits, especially for the natural systems used by man, such as woodland ecosystems, agrarian ecosystems, and waterways, and assessing the risks inherent in actual and potential pollution and damage;
- Listing, studying, and largely closing materials cycles in production, the vast majority of which are currently unrecorded and open;
- Developing technologies to prevent, reduce, and remedy damage to the environment;
- Devising environmental management strategies guaranteeing, simultaneously, long-term exploitation and conservation of natural systems.

All this can be achieved only if science, technology, and industry work more closely together on solutions than before.

It will also be necessary for environmental R&D, which has previously been science and technology-oriented, to join forces with economic and social science disciplines.

Integrated Environmental Protection

In the future, as now, the BMFT intends to continue providing practical solutions to local environmental problems, and it also wants to make identifiable contributions to solving global environmental problems. It intends to play a part, too, in achieving an ecology-oriented structural change in industry, and thereby in reconciling ecology and economy. The redirection of funding will therefore also focus on achieving technical progress ensuring that, wherever possible, "integrated" solutions avoid the production of environment-polluting residues or wastes in the first place.

Understanding material flows and cycles and environmental systems, such as ecosystems or the climatic

system, is necessary if meaningful tactics, technical solutions included, are to be developed. This is illustrated by three examples of future priorities: cycles, production-integrated environmental protection, and changed land use.

Cycles

In order to understand and predict anthropogenic changes in environmental systems, it is essential to know the major system parameters, especially those of the decisive substance cycles. Of outstanding importance here is water, i.e., the hydrological cycle, which has the greatest effect on our climate, yet whose present level of natural availability is to a great extent jeopardized by the possibility of climatic change.

A preliminary study currently under way aims to determine priority areas of action that will enable environmental research and technical development both to improve our level of knowledge, e.g., on the future availability of fresh water resources or a possible change in sea level and its consequences, and to initiate the correct developments for environment-friendly technologies.

Production-Integrated Environmental Protection

The main aim is to offer integrated solutions to prevent industrial production and agriculture from polluting the environment right from the outset.

What is primarily involved is an environment-compatible, cyclic economy designed to prevent or reduce environment-polluting residues from production processes and to recycle residual matter or reutilize it as raw materials for other products.

Decisive contributions to converting material flows in production into closed cycles are expected from environmental engineering, where medium-sized enterprises in particular have a chance to participate in the future growth of this sector of industry by providing an intelligent link between technical concepts and their operational implementation.

With a view, also, to the market relevance of the products and the competitiveness of companies in Germany, the BMFT therefore intends to make these topics the subject of the strategic dialog between politics, industry, and science.

Changed Land Use

In addition to substances polluting environmental systems, great importance is also attached to the increasing changes in land use both in Germany and worldwide.

This includes the depletion of the rain forests, the growth of urban and industrial areas and of traffic areas, and the unecological cultivation of agricultural land, with the associated problems of soil degradation. In order to gain a better understanding of this range of problems in all its complexity and multiplicity, significant landscape types,

such as woodland, farmland, urbanized industrial areas, or inland waterways, are taken as examples on the basis of which interdisciplinary research teams will draw up strategies for revitalizing, shaping, and cultivating similar areas in the long term.

It is common to all projects working on the various priority areas that not just the requisite system and related knowledge will be gained, but also practical strategies or concepts for reclamation and environmental management.

Germany: Innovation Strategies for New Laender Adopted

MI0806130893 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 16 Apr 93 pp 3-4

[Text] In view of the difficult economic situation, the new federal laender are faced with particular challenges in restructuring their R&D environment. Industrial research is in a particularly critical position. At the end of 1989, trade and industry in the former GDR employed 87,000. According to estimates of the Association of German Science Foundations, this figure could have dropped to around 24,000 by the end of 1992. Only 2.5 percent of Germany's research-intensive exports originate from the new laender.

Particular importance is therefore attached to eastern German industrial research funding. The negotiations for the supplementary budget, created the conditions for releasing 200 million German marks [DM] for 1993 and 1994 for this purpose.

The innovation strategies of the BMFT [Federal Ministry of Research and Technology] begin with a package of measures designed to boost industrial research in the new laender in four fields of action:

- creating an infrastructure that promotes R&D;
- raising in technical competitiveness;
- creating technology-related jobs creation;
- funding innovative small business.

In 1993, DM330 million is available for this package of measures.

In addition to funding for innovation advice, building up an R&D infrastructure will require access to databases, technology transfer centers, especially via the further expansion of technology and entrepreneur centers [as published].

The companies' technical competitiveness is to be increased by a higher level of participation in the BMFT's specialized technology programs, which will develop the measures designed to accelerate the application of leading-edge technologies and raise market effectiveness especially with the new laender in mind.

Distinct successes in creating an innovative small- and medium-sized enterprise structure in the new laender have been achieved by funding newly established technology-oriented companies, which began in June 1990. Over 150 new firms have already been promised funding. The high level of response to this initiative is an expression of the high innovation capability of eastern German scientists and engineers. The BMFT will therefore extend the measure beyond 1993. The same applies to the initiatives for supporting innovative small business: The appointment of 1,960 researchers and developers has been achieved with the R&D Personnel Growth Promotion for the East (ZFO) initiative. So far, 1,350 development projects worth roughly DM110 million have been funded with the two initiatives on Contract Research and Development Funding for the East (AFO) and for the West/East (AWO).

Some 1,600 medium-sized enterprises and R&D facilities in the new laender have so far received funding under these three initiatives.

Overall, the BMFT's innovation strategies promoting efficient industrial research are currently supporting the creation or preservation of almost 9,000 R&D jobs in industry in the new laender.

The priority concern now is to safeguard or further expand the stock of efficient R&D capacities in the new laender, thus improving the technical competitiveness of the companies. To this end, a review is taking place of where and how the existing and successful set-up is to be changed or expanded. As an initial addition to the program range, an initiative designed to funding joint research between industry and the universities is planned.

Italy: Government Law Funds Technological Innovation

MI0306122393 Milan GENTE MONEY in Italian Apr 93 pp 72-75

[Article by Stefano Cardarelli: "The Money Is There, All You Need To Do Is Ask For It"]

[Text] Not all businessmen, especially the smaller ones, are aware of it but there is a law that encourages innovation in small businesses by making contributions and funding available on preferential terms. This law has been in force since 1982 (Law No. 46 of 1982 to be exact) and was improved in 1991, the procedures being simplified and the benefits increased.

More than 1,400 small and medium-sized industries have enjoyed these benefits to date. But how does a business go about applying for funding? What are the necessary requirements? What kind of innovation is likely to be rewarded? What follows is a detailed description of the most efficacious and perhaps the only financial support system for small industries in Italy.

Law No. 46 set up the Special Revolving Fund for Technological Innovation (known by the acronym FIT) under the auspices of the Ministry of Industry. The purpose of the fund was to finance programs already in progress, or about to be started by industries, and directed toward introducing important technological advances for the development of new products or for the study or improvement of new manufacturing processes.

In effect the law makes provision for the allocation of funding on preferential terms, up to 50 percent of which may be in the form of a grant for "programs" through which businesses intend developing an innovative product or manufacturing process. This implies that only those businesses with a certain amount of experience or that have been on the market for several years, are eligible to apply for funding.

The introduction of a new product and/or manufacturing process consists of searching for, and finding, new technical solutions that will result in an appreciable technological leap forward. So innovation does not mean modernization or simply improving a product and/or manufacturing process. It means designing, testing, developing, and applying new technical solutions that represent not only technical but also economic progress. Solutions able to provide, for example, better performance, lower production costs, improved work-environment safety, a reduction in environmental impact, appreciable reductions in the use of raw materials, or automation of the manufacturing process.

Under Law No. 46 of 1982, funding may be provided for a project from the study phase through to the so-called preindustrial phase, including therefore the development of any prototype of the product and/or process. Costs directly related to the industrialization phase of the program are not, however, admissible.

Both large-scale and small to medium-sized industries have access to the fund, although the bigger industries are only eligible to receive funding for programs in certain specified sectors. The two basic parameters used to define the size of a company are:

- 1) invested capital (fixed assets net of depreciation and monetary revaluation);
- 2) the number of employees on the books at the date of presentation of the application.

[Box Insert p 72]

Who Can Apply

Maximum Size of Company

1st parameter - less than 300 employees

2nd parameter - invested capital of less than 16.33 billion lire

Level of Innovation

Innovative programs—funding equals 35 percent of costs

Highly innovative programs—funding equals 55 percent of costs [end of box]

Costs Admitted For Funding

The following costs may be admitted in an innovative program.

1. Personnel costs: based on the activities of a technical work group that is directly dedicated, either on a full-time or on a part-time basis, to the development of the program.

2. General expenses: a lump sum fixed at the rate of 25 percent of personnel costs.

3. Internal work orders: these represent the supporting services effected by personnel from departments within the company who do not form part of the group directly involved with the program.

Each work order may include the costs of training inherent to the order, whether internal or external.

4. Services rendered by third parties: these being the services of consultants and external work orders.

5. Investments: these concern the purchase of equipment, instrumentation, machinery, and so on, to be utilized during the development of the program. The effective value of the investment (purchase price or development cost) will be calculated in proportion to its utilization within the program.

Therefore, the admissible amount is quantified both in relation to other possible uses in the development of the program, and in relation to its residual value as a "source of income" (determined on the basis of the rate of depreciation) at the end of the program.

6. Materials: these are the raw materials, the semi-processed materials, the expendable materials, and so on, employed during the course of the program.

7. Missions and visits: these are admitted when related to activities forming part of the innovative program.

[Box Insert p 73]

How To Apply For Funding

1. Application to the ministry (with attachments)

2. Meeting at the ministry to discuss the plan

3. Appraisal (not binding) by a university professor

4. Meeting of the technical committee to make a decision

5. In the event of a positive outcome, allocation of the funds. [end of box]

Documents To Be Presented

1. Application for funding with revenue stamp affixed.
2. Attachments (detailed description of innovative program).
3. Chamber of Commerce certificate.
4. Court certificate.
5. INPS [National Institute of Social Security] certificate.
6. Declaration regarding any other funding granted.

The company must present its application (at any time, there is no closing date,) printed on paper to which a revenue stamp has been fixed, to the Ministry for Industry, Commerce and Crafts, Industrial Office, Industrial Production Department, together with the following four attachments as provided for in the Ministerial Decree of 20 October 1986:

- a) Details of the company.
- b) Description of the technological innovation program.
- c) Further details of the program performance to date, in the case of programs that have already been initiated.
- d) Anticipated results of the program from an economic/industrial viewpoint.

Programs that are already under way may be presented, provided that on the date of application, the portion of the program already completed does not represent more than 40 percent of the cost of the entire program, and provided that the main objectives of the program itself have not already been reached.

Subsequently, after a period of two or three months, the ministry will arrange a meeting at its offices, during the course of which the company (usually represented by an administrative director and by the technical manager in charge of the innovation program) will take part in a discussion about the contents of the program.

During the course of the meeting at the ministry the company will nominate three university professors (specialized in the field relating to the innovation program). The ministry will select one, who will be given the task of making a technical evaluation of the innovativeness, or otherwise, of the program. This evaluation, which is not binding on the ministry's decision-making body, must be forwarded to the ministry together with the supporting notes prepared by the company for the completion of the technical enquiry.

After a period of four to five months from the presentation of the documentation, the application is ready to be submitted to the technical committee for its opinion. On the basis of the technical/economic investigations conducted by its offices, the committee will examine the admissibility, or otherwise, of the whole, or part of, the

innovative program. It will also indicate the percentage of the admitted cost of the innovative program that will be funded by the FIT. The law provides for two possible funding percentages, depending on the "level of innovation."

Preferential term funding equivalent to 35 percent of the admitted costs may be granted for a program evaluated as being "innovative," or the equivalent of 55 percent if evaluated as "highly innovative."

Amendments to the Law

Article 37 of Law No. 317 of 1991 amended Law No. 46 of 1986, introducing increased benefits in favor of small and medium-sized industries.

In particular:

- a) Modifications to the procedures: for interventions relating to programs with an estimated cost of not more than 10 billion lire, ratification by CIPE (Interministerial Committee for Economic Planning) will no longer be necessary. Although this disposition will also be extended to bigger companies it will mainly benefit small and medium-sized companies that rarely submit programs with a cost of more than 10 billion lire.

Doing away with the need for ratification by CIPE will cut down on the procedural process by at least eight or 10 months, which is no small amount.

- b) Modification of the preferential interest rate: exclusively for the small and medium-sized industries, the rate of interest has been reduced from 60 to 50 percent of the so-called base rate. For example: The base rate for February 1993 was 15.45 percent, corresponding to an interest rate of 7.75 percent charged to the industries (before the modification of the law it would have been 9.27 percent).

Conditions

Funding is provided on preferential terms under the following conditions:

- Duration: A maximum of 15 years, including a five-year utilization and pre-depreciation period.
- Interest rate: For the utilization and pre-depreciation period, 15 percent of the base rate. For example for contracts stipulated during February, a company would pay a rate of 2.8 percent for the entire pre-depreciation period. For the depreciation period, in the light of recent changes, the interest rate would be 50 percent of the base rate.
- Allocation: Payments in not more than six installments, and a final payment on completion. At least 20 percent of the funds are allocated in the final payment after a ministerial inspection.

As previously mentioned, a company may request, specifying its reasons, that a portion of the funds (not more than 50 percent) be converted to a grant. This will be

equal to the existing difference between the pre-depreciation and depreciation installments, calculated at the base and preferential interest rates.

Such a contribution varies between 55 and 60 percent of the portion of the funding that has been renounced.

Netherlands: State Research Agency Presents Projects at Hannover Fair

M11106101593 Eschborn NACHRICHTEN FUER AUSSENHANDEL in German 21 Apr 93 pp 1,5

[Article by Guenther Maier: "Research Networking in the Netherlands: TNO Institutes at Hannover Fair With Interesting New Products"]

[Text] The Dutch Applied Scientific Research Organization (TNO) institutes are presenting their new "IT&T Initiative" in Hall 8 at the Hannover Fair. This initiative is a research networking concept that makes it possible for several disciplines to participate simultaneously in the same research project.

TNO operates 30 institutes, employs a workforce around 5,000-strong, and performs contract research worth over 760 million Dutch guilders per year. The organization is presenting new information technology, telematics, and telecommunications developments in Hannover.

TNO is also participating in DRIVE, the EC road transport safety program, and is carrying out research under the Intelligent Driver Support System (GIDS), an electronic system to assist the driver in decision-making. The system has recently undergone manoeuvring error prevention trials in Dutch road traffic.

GIDS gives danger warnings when approaching objects, takes control of steering in emergencies, and ensures that the speed limits on a given road are observed. The system is designed to relieve the strain on the driver, and not to provide additional distraction. It is claimed to take account of the driver's proficiency and to react continuously to changes in the traffic environment, which are a source of strain.

TNO psychologists are also investigating how systems of this kind can be used to optimize safety and traffic flow. The EC has welcomed the results achieved so far and has made additional development funds available. In Hanover, TNO is showing "what the intelligent car of today can do."

In cooperation with industry, TNO researchers are also developing electronic systems to identify, analyze, and direct freight and traffic streams, thus enhancing safety and increasing capacity. Such systems could reduce congestion not only in city centers, road networks, air corridors, and shipping lanes, but also in warehouses and in-house transport paths.

Another of TNO's areas of research concerns optimizing the routing of information, services, and goods. The "Taste" system has been developed to assist firms in

controlling logistical operations and comprises analysis, planning design, and simulation modules.

The system uses distribution sequence data to design a flow model for goods and information between suppliers, manufacturing and distribution centers, and customers. A complete network picture of the distribution procedures can be derived and simulated from a detailed breakdown of the interaction between the separate stages of the operation.

The TNO is also working on developments in virtual reality (VR) computer technology. Realistic learning situations that under normal conditions would be too dangerous or costly can be simulated by using microelectronics to replicate a potential situation.

Continued improvements in image quality and ease of use will bring such high reproduction quality that users of such systems will hardly be able to distinguish between imitation and reality.

TNO is demonstrating this "reality from the electronic face mask" at the Hannover Fair. Data flows between firms, organizations, and mainframe computers and other centers are continually increasing; electronic data exchange makes for new modes of cooperation, and helps save time and money. It will not be long, for example, before supermarket shelves are automatically restocked.

TNO is conducting practical trials with Product Data Interchange in the retail trade and in brewery distribution. For example, the Oranjeboom breweries can use echo-sounders in their customers' cellars to check when their tanks need refilling: 500 public houses are already linked to this remote monitoring system.

A system known as Manus consists of a robot arm with six degrees of freedom and two-finger grippers and helps users of electric wheelchairs by complementing their upper limbs.

The system is designed to accommodate operating components of various kinds, which extend the radius of action of the Manus arm or the wheelchair. Whether a handicapped person's problem is muscular atrophy or paraplegia, the system can maximize mobility to the extent permitted by his or her medical condition.

In addition to its gripping arm, Manus has a mobile telescopic component that can lift small objects from the floor. Its control technology is different from that of industrial robots, where rapid, precise movements are normally required.

Manus is designed for selectivity, leisurely reaction time, and predictability of arm and finger movements. The user can correct the system at any time, even if a programmed action has already been carried out.

Computer-assisted simulations have played a major role in vehicle safety and accident prevention for around 20 years. The TNO Institute of Road Vehicle Safety has

developed the "Madymo" mathematical dynamic model, the improved Version 5.0 of which was presented at the industrial fair.

Madymo provokes collisions in the computer so that colliding vehicles, safety belts, or child seats can be tested.

The program is can be used for two- and three-dimensional simulations with either individual elements or multicomponent mock-ups, both inside and outside vehicles, and for representing mechanical interactions in accidents. TNO claims that the system has been used successfully in research, not only in Europe, but also in the United States and Australia.

Germany: Daimler-Benz Chief Calls for Faster Research-to-Market Time

MI0206131393 Munich SÜDDEUTSCHE ZEITUNG in German 26 Apr 93 p 33

[Text] "Our research findings have been translated into salable products and processes with far too much perfectionism and thus often far too slowly." Such was the self-critical explanation that Daimler-Benz AG of Stuttgart's Research Director Volker Lehmann gave at the Hannover Fair for the fall in competitiveness of many sectors of German industry.

Despite there being ground to make up in applied research, Lehmann is convinced that "we can use the current economic downturn to make ourselves more competitive." According to Lehmann, Daimler-Benz, with 89 billion German marks [DM] in revenues Germany's biggest industrial conglomerate, spends about DM600 million a year on research, equivalent to 8-10 percent of the internally financed development costs of the four divisions: Mercedes-Benz, AEG, German Aerospace (DASA), and Daimler-Benz InterServices. There are nearly 1,700 researchers working at the development centers in Stuttgart, Ulm, Frankfurt, Berlin, Munich, and Friedrichshafen.

Lehmann called for a consensus-based collaboration between policymakers, society, and industry to safeguard Germany's long-term future as a center of research and, consequently, of industry. "We must bear our locational advantages in mind: Creativity and quality, a high standard of education and research, and a sophisticated, intelligent, and environment-compatible manufacturing base are our trump cards, and we ought to play them to our best advantage." It was up to the state to create a climate conducive to innovation and an efficient infrastructure. It should promote new technologies, for example by awarding project contracts, by encouraging the drafting and adoption of industrial standards and norms, and by harmonizing laws and regulations throughout Europe.

Lehmann said that over the last two years Daimler-Benz had developed what it called integrated research and development management, which would enable the

group to make decisions more quickly than before and bring research closer to the market. The stage-by-stage development of new products that had once been standard practice had been replaced by a concerted parallel process. Group management agreed fresh research objectives every year with the various divisions. According to Lehmann, Daimler-Benz is now making more use than before of the operations researcher, who looks at whether the various development projects will be capable of turning research findings into a marketable reality as desired.

Germany: JESSI Integrated Vacuum Wafer Processing Project Advances

BR0906133993 Bonn TECHNOLOGIE-NACHRICHTEN MANAGEMENT-INFORMATIONEN in German 29 Apr 93 pp 7-8

[Text] The purpose of the IVPS (Integrated Vacuum Processing System) JESSI (Joint European Submicron Silicon Initiative) flagship project is to develop a multi-chamber processing system for microchip manufacture. The Fraunhofer Integrated Circuits and Component Technology (AIS) Team in Erlangen, headed by Professor Heiner Ryssel, is playing a leading role in the project, the intention being to integrate the measuring and control processes developed by the team into the system, which is the first of its kind in the world.

The JESSI IVPS project is designing a cluster system, in which handling of the sensitive silicon wafers used for producing electronic components is fully automated within a vacuum. This makes it easier to avoid impurities in the environment than with conventional processing steps. A robot inside the system ensures that each wafer reaches the individual process chambers at the right time.

The IVPS innovation compared with previous multi-chamber systems lies essentially in the in situ integration of measuring processes into the system. Wafer quality will be monitored between the separate processing steps, obviating the need to remove them from the vacuum, as required in conventional systems. For example, oxide or metal films just a few nanometers thick (a nanometer equals one millionth of a millimeter) are measured during the process. In addition, particles a few micrometers in diameter (a micrometer equals one thousandth of a millimeter) need to be identified. The wafer surfaces are examined for the minutest concentrations of chemical impurities. AIS's Semiconductor Production Equipment section under Dr. Lothar Pfitzner has been conducting intensive research on in situ measurement and control techniques since AIS was established in 1985. Project leader Claus Schneider developed an ellipsometric process for controlling coating processes using an optical measuring instrument for his dissertation. AIS's experience with this and numerous other highly sensitive measuring processes is now benefiting the JESSI IVPS project.

The other parties to the project are the major European semiconductor firms and five European manufacturers of semiconductor production equipment. The Bavarian State Ministry of Trade and Transport has invested around 2.5 million German marks in support of the project.

It is also being financed by the BMFT [Federal Ministry of Research and Technology], and receives substantial funding from industry as well.

Further information is available from Claus Schneider, Fraunhofer AIS Team, Artilleriestrasse 12, D-W-8520 Erlangen, Tel. 09131 81 04 42.

FRG's Wissmann on New Policies, Tax Credits for R&D Investments

Wissmann on Problems, Measures

93WS0453A Munich TOP BUSINESS in German
May 93 pp 120-126

[Interview with Matthias Wissmann, Federal Minister for Research, by Brigitte Vogel, editor for TopBusiness; place and date not given]

[Text]

Research Policy

The Chance Provided by the Crises

Empty tills, fatal gaps in innovation and expensive monuments to failed subsidy policy—Matthias Wissmann, Federal Minister for Research for three months, has taken on a difficult office. TopBusiness asked the 44-year-old new member of the cabinet how he wants to reset the switches.

[Vogel] Mr. Minister, Germany as a technological location has lost attractiveness and competitiveness in important areas. How do you want to restore the fitness of the Germans for the high technology world market?

[Wissmann] The first item on the agenda that I see is not to pull in my horns as the night watchman for research and technology policy but rather to fight actively for more future investments in the Federal budget.

[Vogel] Is that not rather hopeless at a time where there is not even enough money for today?

[Wissmann] Cutting funds meant to assure the future is dangerous and short-sighted. This is also being understood to an ever greater degree. Besides, I am not the only one fighting this fight at the Federal government level. Almost every company director is fighting it, too. The fact that research outlays by the economy are growing at a considerably lower rate than our gross domestic product makes me uneasy. Since 1989, their portion of total R&D expenditures has dropped continuously from 62 to 58 percent.

[Vogel] Let us stay with the government outlays. Here, Germany, at about two per cent of the gross domestic product, has dropped far behind Japan and the U.S.

[Wissmann] This comes from the fact that, while the budget of the Research Minister did grow by 5 percent, the Federal budget for 1990/91, however, increased by about 30 percent. Since that time, there is a strategic gap in the heart. Of course, under the difficult conditions of the moment, this gap cannot be easily closed.

[Vogel] However, understanding for provisions for the future cannot be that far off in Bonn.

[Wissmann] In any case, I was able to unblock 200 million German marks [DM] for the new Federal Lands—one success that I am very proud of.

[Vogel] Money is one side. Recognizing the technologies making most sense to spend it on is the other.

[Wissmann] The government can only provide stimuli in this area and identify future fields together with the economy. The government, however, should not try to put itself in place of the engineers. In cases of doubt, they have a better nose for future developments.

[Vogel] However, the Research Minister can set a direction. Instead of spending billions for failed investments such as the fast breeder reactor or for space travel, the Germans would have done better to support the very important area of microelectronics. A lot has gone wrong.

[Wissmann] In spite of all this, we are a player in the major leagues. Still, we have to recognize our weak points. The first big point is that, in contrast to Japan, the process of converting good basic research into products capable of success on the world market is still much too slow here. Something must be done about this.

[Vogel] What antidote do you have?

[Wissmann] For example, I want to provide improved support for projects of joint-venture research, cooperation between small and medium-sized businesses, both among each other and with research institutes. A joint-venture analysis that I will encourage should, for example, scrutinize the large research facilities with regard to the possibility of cooperation with industry. In addition, I have asked the research director of Daimler-Benz, Professor Hartmut Weule, to work out suggestions for improvement together with a group of experts.

[Vogel] Should not the new Minister of Research give credit for more innovation power to small companies than to large ones?

[Wissmann] Indeed. The creative spirit, the tinkerer mentality is usually greater in small units than in large firms. A few numbers illustrate this. Between 1975 and 1991, the efforts of small business owners for research joint ventures grew by a factor of 14. They understood that they could only be innovative and develop together.

To accelerate this, I want to make an additional DM200 million available in the next years.

[Vogel] How much are you spending on the whole for the support of smaller companies?

[Wissmann] About DM600 million.

[Vogel] That is just small potatoes measured against the billions flowing into the tills of Daimler-Benz and Siemens.

[Wissmann] Admittedly, the staff departments of large firms are better advised and quicker when it comes to moving out with support funds. For this reason, the new concept must have a simple structure and be organized to eliminate bureaucracy.

[Vogel] How will this look in specific terms?

[Wissmann] I will concentrate on three pillars. First we have the technical programs that we already are familiar with and which are working well. The second pillar is formed by loans for "jump-start" innovations. These are developments that are not part of an overall plan but advance something in terms of quality. The third new pillar comes from research joint ventures. Beyond this, I want smaller German companies to profit more than previously from EC funds. I have already addressed this topic in Brussels.

[Vogel] Now, the small business owners who are already overtaxed with the bureaucracy in Bonn must also suffer through the much more complicated application mills of the EC?

[Wissmann] Yes, the research policy of the Community has not been very convincing in this area before. The problem is that small and medium-sized companies were judged using the same criteria applied to large companies. However, I am assuming that the trend for EC funds will grow. Why should we not put them to more intelligent use?

[Vogel] You touched briefly on giving tax breaks for research and development.

[Wissmann] Such incentives exist in almost every important industrialized country. The Clinton government in the U.S. is about to push through a considerable tax incentive package by law. I have to wonder why we in Germany can depreciate the concrete in buildings for up to 33 years but do not have anything comparable for R&D expenditures.

[Vogel] Who would then judge what innovation costs are, the Internal Revenue Office?

[Wissmann] Questions such as the clear delineation of R&D expenditure from other investments must, of course, be scrutinized beforehand—even if the danger of piggy-back effects is not very large. For this reason alone, I am not shooting from the hip but rather first want to

discuss with experts in taxes and the economy how we can make the corporate tax structure more innovative.

[Vogel] What relative importance does a vigorous fighter for research structures that are close to the market such as yourself actually ascribe to basic research?

[Wissmann] With all my enthusiasm for technology transfer, I naturally do not forget that this area is one of our great strengths and we lead the world in many fields. For this reason, for example, I also want to increase the elbow room, the financial corridor, for the Max-Planck Institutes. For this year, I have already requested DM30 million more.

[Vogel] It is interesting that the Japanese have been heavily investing in their basic research for some time.

Constrained Budget

How the 1993 BMFT Support Outlays (9.6 billion marks) Break Down

| | Outlays in millions of marks | Percentage of total budget | Change in percent over 1992 |
|---|------------------------------|----------------------------|-----------------------------|
| Basic research | 1674.0 | 17.4 | 7.5 |
| Long-term programs | | | |
| Space | 1815.9 | 18.9 | 4.5 |
| Ocean and polar exploration, nuclear fusion and geosciences | 535.6 | 5.6 | 1.8 |
| Preventive research | | | |
| Ecology, environmental technology, climate | 713.4 | 7.4 | 3.5 |
| R&D in health services | 512.0 | 5.3 | 7.2 |
| Occupation and technology, historical monument preservation, the humanities | 503.7 | 5.2 | 10.9 |
| Technology and innovation support | | | |
| Information technology | 1014.9 | 10.6 | 1.9 |
| Energy and raw material assurance | 1050.6 | 10.9 | -3.3 |
| Biotechnology | 296.9 | 3.1 | -2.1 |
| Materials research | 258.3 | 2.7 | 3.5 |
| Technologies of the 21st century, support of the framework conditions | 534.7 | 5.6 | 6.7 |
| Transportation and traffic, air travel | 372.2 | 3.9 | -2.2 |
| Oceanic technology | 47.8 | 0.5 | -21.3 |
| Fraunhofer Institute | 364.3 | 3.8 | 9.9 |

[Wissmann] For this reason alone understanding must be maintained that sciences oriented toward discovery form the basis for later applications. Besides, at just below DM1.7 billion annually, we are also putting a considerable sum into this area. It is just that some Japanese companies are better and quicker in converting good basic research—sometimes even European patents—into products capable of success on the world market than European companies.

[Vogel] And you want to have these companies get a move on?

[Wissmann] Here, we still live too much in ivory towers. The walls built between science here and the economy there are too high. I want to start here and organize a strategic dialogue between natural scientists and those from the humanities, engineers, managers and businessmen.

[Vogel] Do you already have concrete results in this area?

[Wissmann] In the Petersberg Circle, we are developing a concept for future information technologies. In another round that also has interdisciplinary members, we are considering the laser technology of the future.

[Vogel] Do you then have a recipe to overcome the fatal lag in microelectronics? In any case, 90 percent of all memory chips come from Japan.

[Wissmann] We need to clearly concentrate on those areas where we still have a real chance. For example, at the end of March in Itzehoe, we founded a Fraunhofer Institute for Silicon Technology. Among other projects, the development of an electronic eye and a portable system named "Verbmobil" for translating dialogue are being supported.

[Vogel] Are these not niche areas without any great impact on the national economy?

[Wissmann] The government can only give stimuli, the industry must also become active. One thing has become clear. In the competitive area of the triad of Japan, America and Europe, no single national government alone can take the place of companies. The government must make sure that the framework conditions are right, the forces are focused—and that for fields where we still have a real chance.

[Vogel] You are rather optimistic.

[Wissmann] Thank God there is at this time a process of awakening, of reorientation. I view the weakness of our economic conditions and our structures as a challenge to develop new force. With that, we will keep up in the competition with the Japanese and Americans. I once learned that in Chinese, the same character is used for both the word crisis and the word chance.

Credits for R&D Investment

92WS0453B Duesseldorf WIRTSCHAFTSWOCH
in German 23 Apr 93 pp 30-34

[Article by Stefan Wichmann: "Powerful Opponent"]

[Text]

Research

The New Minister Wants to Push Through Tax Breaks for R&D Investments

Matthias Wissmann is sounding the alarm. The short-sightedness of German managers "raises concern," according to the Minister for Research and Technology in Bonn. The reason for the warning is that, under the pressure of the current recession, Germany's companies—through all branches—are cutting their budgets for research and development (R&D) (Wirtschaftswoche 3/1993). Wissmann says, "We are gambling away our most important capital in this way."

Without the branches heavily into research, says the new Minister who just took over the office of his predecessor Heinz Riesenhuber at the beginning of the year, after analysis, there would have been no continual increase in the eighties. With an average of 3.4 percent annually, the production in R&D-intensive sectors grew then at a considerably higher rate than in all other branches. The other branches increased only about 1.6 percent on average. "The upswing of the last decade," concludes the man who studied economy, "was borne substantially by the branches of the economy with a high portion of research."

The fatal point is that precisely now—in the times of weak economic conditions—Germany's economic heads are sawing off their own branch. From 1989 to 1991, the private R&D funds increased by only 8.4 percent. The total German domestic product, on the other hand, increase by almost 26 percent. While the companies of Japan pay about 80 percent of the total costs out of their own pockets, the private portion of research outlays in Germany dropped from 62 percent in 1989 to 58 percent last year. "We must urgently turn this trend around," emphasizes Wissmann.

He also knows how. Tax breaks are to make R&D investments attractive again. Industry is all ears for the proposal by Wissmann. "Germany is almost the only industrialized country that has absolutely no tax support for research investment," complains Hans-Joachim Hass. He is the director of the Research, Technology and Structure Policy Department at the Federal Association of German Industry (BDI).

Germany's most serious competitors—including the U.S., Japan, Canada, France, Great Britain, and Italy—use a variety of instruments designed to stimulate research. In one case, companies may depreciate their

R&D investments at a particularly favorable rate or take a tax credit, other times, additional research outlays directly reduce the tax rate.

U.S. President Bill Clinton is even laying out more. During the next four years, he wants to push targeted high technologies with \$17 billion. About one third of the announced special program—about \$5.4 billion—is reserved for tax breaks.

The Germans, on the other hand, put a cap on the indirect support by means of a tax reduction or investment tax incentive—up to 1990, a total of about DM600 million annually—two years ago. A few programs remain only in the new federal Lands.

With his new thrust, Wissmann met with approval among experts in parliament. The research policy spokesman of the FDP party in the Bundestag is Karl-Hans Laermann. He spoke out for "improved tax framework conditions." Christian Lenzer is the spokesman of the CDU/CSU party in R&D matters. He views tax breaks for research investments as a "necessary component of corporate tax reform."

However, it is still completely unknown who will plug the new holes in the budget of the Finance Minister created in this way. While the top treasurer in Bonn, Theo Waigel, need not plan for tax reductions amounting to billions right away, three-digit million sums would need to be handled.

Wissmann's officials have already calculated in their initial plans where to get the money. Depreciation possibilities for factory construction plans should be restricted. However, this would be a call to arms for an unpleasant opponent: the lobbyists of the powerful construction industry.

East Researchers

Rigorously Degraded

Herbert Berteit is the director of the Structure and Innovation Department at the Institute for Economic Research (IWH) in Halle. He views the eastern German economy as being in a fatal spiral. "Where there is a lack of creative research, there is also a lack of innovation. And where innovation is not forthcoming, there is very little investment." The man is right. The new Lands are running out of tinkers.

At the beginning of 1990, there were about 75,000 researchers in branches close to industry. Now, there are only around 15,000. Precisely those branches are losing personnel fastest without which neither the buildup of a small-business economic structure nor the retention of the industrial core will advance: machine construction, electrical engineering/electronics, the chemical industry, precision mechanics/optics. In these branches, the R&D personnel was reduced in some areas by over 90 percent from the end of 1989 to the end of 1992. "In the old Lands, there are seven researchers for 100 employees in

the industry. With us, there is only one researcher," complains the IWH expert Berteit.

The technological lead of the West could become even greater. The researcher jobs in the Trust companies are in particular danger. About half of the scientists who are close to industry work in such companies. "Most buyers see only cost factors in these departments," says a Trust manager with resignation.

Added to this is the fact that Bonn has reduced the support monies for industrial joint research, the backbone of research in small and medium-sized companies, from DM200 million (1992) to DM170 million. Of this amount, only about DM50 million will go to companies in the East, estimates Kurt Hornschild. He is director of the Industry and Technology Department at the German Institute for Economic Research (DIW). The DIW sees only one way out of this dilemma. "When selecting investors, the Trust should pay attention to creating new competitive structures." Profitable future branches are, for Hornschild, primarily environmental protection, recycling, and biotechnology.

The Trust is now starting at the Leuna Werke AG. There, about 300 researchers, analysts and process engineers are developing "a true circular economy for plastics," explains the director of the research department, Karl Becker. The recycling giant, Duales System Deutschland GmbH in Bonn wishes to purchase the new recovery method even before it has been tested in pilot systems.

Drastic Reduction of Industrial Research in Eastern Germany

93WS0458A Frankfurt/Main FRANKFURTER ALLGEMEINE in German 5 May 93 p 4

[Article by B. M.: "Increasingly Fewer Scientists"]

[Text] The loss of scientists in eastern Germany continues. Only one-third of the 140,000 who once worked in the field of science in the GDR were still active in this area last year. One-third of the professors at the institutions of higher education are being let go. Of the 74,000 employees in industrial research, only about 15,000 have remained. This branch of research, so important for the economy of the new laender, was the primary topic at the science press conference, at which scientists from the new laender talked with a representative of the Federal Research Ministry. Since the data protection law prohibits investigations, it is not known what has happened to the laid-off scientists. But it is said that many have emigrated to western Germany or abroad. They might be urgently needed when the great wave of professorial retirements sets in after the mid-1990s in western as well

as in eastern Germany. Some industrial researchers have saved themselves with new enterprises, often founded by themselves, or in labor-creating measures. Those run out at the end of 1993. What will become of them [the scientists] then, no one knows.

In Jena, for example, silicate technician Lauenroth reported, 45 out of the previous 620 employees at the former heat technology institute have remained. Help was provided by founding ReFIT e.V. (Regional Support of Research, Innovation and Technology), whose 320 jobs, however, are uncertain job creation positions. At about the same time, the Waermetechnik und Umweltschutz GmbH Jena was founded. The biggest problem is financing the new companies, Lauenroth said. New partners know too little about that. There are Federal and land subsidy programs for innovative enterprises, but they only run for one year; developing new products up to the market readiness stage takes longer, however. Lauenroth proposed making venture capital, interest subsidies and investment assistance available. Government contracts instead of state support is also conceivable.

The delegate from Chemnitz to the European Parliament, Richter, a cofounder of Democratic Awakening and since 1990 a member of the SPD [Social Democratic Party], harshly castigated the Federal Research Minister. The liberal economic opinion that the state should stay in the background and only support what has already been started independently by the economy, has not proved itself in the new laender. In key disciplines such as information and communications technology, biotechnology, materials research, ecological research and environmental technology, the ministry's funding has dried up or been cut back, because it continues to grow in space technology. For this reason the DM200 million which the Research Ministry is now making available to supplement eastern German industrial research are very welcome. The proposal to found additional research corporations should be rejected, however, because those which have been created since 1990 have largely failed. In conclusion Richter called the development in eastern Germany a science catastrophe.

The representative of the ministry, Gruebel, did not want to hear of such a catastrophe. The painful restructuring process has essentially been concluded and most of the gaps have been filled in. Precisely in the extra-university basic and precautionary research an "institute landscape which is competitive in quality and quantity with the West" has developed. The recommendations of the Science Council have without exception been implemented, and within the space of one year 100 new research institutes and branches were founded. Three new major research institutions have been established in the new laender, and, in addition, numerous Blue List institutes and two institutes of the Max Planck Society, which is planning an additional 12 institutes.

One of the new major research centers, the Max Delbrueck Center for Molecular Medicine in Berlin-Buch,

was created out of three former GDR institutes; 1150 employees were let go. The head of the institute, Ganten, said that despite all government efforts—90 percent of the major research centers are paid for by Federal funds—the Eastern Upswing has failed to materialize in science. The need for funding has been underestimated. The mood among scientists is even worse than the situation, and there is great uncertainty. The holders of the 250 job-creation positions at his institutes know that the measures are temporary. But it is also uncertain whether the 86 scientists who are being paid out of the advanced education renewal program and the scientist-integration program can be kept on, because these programs as well run only to 1996. This does not contribute to an atmosphere of awakening. Ganten wished for a "solidarity pact," a more active cooperation by major research organizations, the individual researchers and industry for the buildup of research in the new laender.

FRG: Government Plans Restructuring of Large Research Institutes

93WS0467A Frankfurt/Main FRANKFURTER
ALLGEMEINE in German 8 May 93 p 14

[Article by Stue: "Criticism of Major Research Institutions"]

[Text] The federal government is keeping the concept of major research institutions but insists on a structural reform. Thus, "temporary institutes" are to be established and the share of temporarily employed personnel will be increased. Closing an institute when its function has been fulfilled should be part of the normal process. Bernd Neumann (CDU [Christian Democratic Union]), the parliamentary undersecretary at the Federal Research Ministry, stressed in conversation with this newspaper. "Today, this is something that happens once in a 100 years." Meanwhile, in an internal position paper the Federal Association of German Industry (BDI) criticized "rigid bureaucratic structures" at the major research institutions and demanded greater participation by business and industry in finding topics.

Among the 13 western German institutions are the Alfred Wegener Institute for Polar and Ocean Research (AWI) in Bremerhaven, the German Electron-Synchrotron Foundation (DESY) in Hamburg, which works with elementary particle physics, the German Cancer Research Center in Heidelberg and the nuclear research centers in Juelich and Karlsruhe. In the new laender three major research institutions for environmental research, molecular medicine and geosciences are being established. The BDI acknowledges that, after their original tasks were completed, the research institutions have made efforts to renew themselves with respect to research topics. But it is not possible to perceive any approach to industry. "Industrial key technologies such as information and communications technology, bio- and genetic engineering and new materials technologies, which are of central importance to industry, are not sufficiently covered by the major research institutions."

Neumann considers the question of whether major research has become too bureaucratic to be justified. One must prevent the danger that structures become entrenched. Whether the establishments are operated as foundations or corporations, they are not as flexible as private companies. Their efforts to become more efficient should be recognized, however.

Research Minister Matthias Wissmann, who is leaving, is adhering to the limitation of budget funds for major research institutions, which his predecessor Heinz Riesenhuber had decided to keep at the 1992 level for the period until 1995, and the cutback of 1,900 positions within the same period. He would also like to realize his special concern, more rapid implementation of research results into marketable products, at those major research institutions which can come under consideration for it. A four-man expert team under the leadership of Hartmut Weule, a member of the research board at Daimler-Benz AG, is to take the Juelich Research Center (KFA) and the Karlsruhe Nuclear Research Center (KfK) under scrutiny. The results of the study are expected in the fall. The other institutions are also asked to make suggestions about spinoff of services, privatization and temporary cooperation between researchers and industrial users. Neumann sees good beginnings at the German Aerospace Research Institute (DLR) in Cologne.

The BDI greets these proposals and in addition demands that the major research institutions do without the research minister's "fine control." The existing industrial advisory council and discussion groups must be more heavily utilized to encourage participation by business and industry in finding research subjects. Furthermore, the BDI proposes joint evaluation associations for the results of the research. The major research institutions are not so led by the government leash that greater cooperation with industry is not possible even now, says Neumann. The fact that an exchange of personnel with business and industry is not getting under way is not due to the lack of readiness by the scientists, but to the fact that good employees in the research institutions are not as highly paid as in industry.

IFO Institute Criticizes German Research Policy

93WS0467B Frankfurt/Main FRANKFURTER
ALLGEMEINE in German 10 May 93 p 15

[Article by gl: "IFO Pleads for Increased Research Support"]

[Text] A study by the IFO [Institute for Economic Research] institute in Munich combines doubts that Germany has sufficient innovative capability with sharp criticism of the economic policy. A technology policy that wants to meet the challenges cannot make do without the flank protection of economic policy. But the economic policy denies the need for action and pulls back to an "ordoliberal policy position," which "in view of the failure of the overall economic goals must at least be critically scrutinized." "To be sure, theoreticians

might be right in their arguments that these problems cannot occur in their model world," the institute criticizes. But these courses of action are questionable when the assumptions which form the basis for the models do not agree with reality.

The IFO institute insistently points to the increased research support in other countries, such as Japan and the United States. In comparison with them, the funding volume of the Federal Research Ministry looks rather modest. Admittedly, in the institute's opinion, too much is being asked of the FRG in competition with such funding in the United States and Japan. That is only possible at the level of the European Community. The funds appropriated from 1994 to 1998 for the EC's research and technology policy, amounting to a little more than ECU13 billion represent an "adequate volume of financing for this," according to the institute. Perhaps, the institute says, the announcement of additional research and technology policy measures in Japan and the United States will lead to the western European countries bundling their resources and becoming an equal partner in the triad of high technology.

With its studies of innovation behavior the institute also believes that it can prove some "false directions in the innovation management of German companies." But, in its opinion, that is not where the principal reason for the "apparent wrong development" in Germany as a location should be sought. With the manifold demands for higher innovation efforts in industry, one is overlooking that the latter makes its decisions according to managerial demands, not national economic and political wishful thinking. The management of international companies will therefore increasingly encounter the need for argumentation when it is a matter of defending investment plans for locating in Germany as opposed to lower costs. As examples of negative developments in Germany the economics researchers mention electronics and genetic engineering. Germany as a location is "probably out of the race" for the production of new generations of semiconductor memory chips. In genetic engineering as well the goal of creating "innovation-friendly framework conditions" by passing the applicable law in 1991 was not reached.

According to the institute's studies, the share of products "likely to grow" of the sales by western German industry in 1992 has further declined. In order once again to achieve a "balanced sales structure" which could compensate for threatening sales losses in stagnating or shrinking markets, the share of product innovations must be increased over the next few years. The IFO institute believes it can prove these connections by means of a poll from December of last year. About 80 percent of the companies among the enterprises active in growing markets had undertaken product innovations, but only 60 percent of the companies working in stagnating markets. For shrinking markets the fraction of innovators had even dropped to 52 percent. The share of new products of the total sales by western German industry amounted to an average of 11.3 percent in

1991, as calculated by the institute. The economic downturn also dampened the innovation capability. If all plans were to be realized, the research and development spending of the western German economy in Germany would increase in nominal terms by 4.5 percent to DM56.2 billion, according to information by the institute. However, this research budget must be viewed against the background of higher rates of price increase.

FRG: Problems of University Research Discussed

93WS0467C Duesseldorf *HANDELSBLATT* in German
11 May 93 p 6

[Article by rg: "Erichsen: Reference to the Successor Generation Must Not Be Lost"]

[Text] The president of the Conference of University Presidents (HRK), Hans-Uwe Erichsen, warned at this year's HRK meeting in Erlangen against an exodus of "excellence from the higher education institutions" to research facilities outside universities. The university is losing its connection with the scientific successor generation and could therefore be degraded to a training facility "for senior students."

Erichsen demanded that one should think about new forms of scientific work in basic research. It is necessary to develop an organization at the university or in a university network which is autonomous regarding budget policy and possesses a permanent infrastructure that spans many fields, which simultaneously works at the university and in an external framework. The Federal and local governments should jointly finance these "research colleges" according to the proven method.

With a view to the European integration, the HRK is urging that research support must remain a national task. In so doing, this funding must be determined by the principle of "autonomy of science and quality implementation." A corresponding organization which seriously and transparently evaluates research projects must still be developed, in Erichsen's opinion. The opportunity to take major steps here is offered at the earliest in 1994, when the FRG holds the presidency of the EC Council.

In conjunction with the meeting's topic of "Higher Education Research as a Factor of Location," the representatives of the institutions of higher education warned against neglecting basic research in Germany. Prof. Ernst-Ludwig Winnacker from Munich described as misleading statements by the Federal Association of German Industry that state support must include "all levels of the innovation process from basic research to the field leading up to market implementation." "Instead of burdening the state with applied industrial research as well in these difficult times, industry should instead behave anticyclically and—on the contrary—massively increase its own research efforts."

The biochemist drove it home to his colleagues that they all too often ignore the problem of technology transfer or

are not prepared to step down into the lowlands of application-oriented basic research. Since, furthermore, industry is not in a position to utilize the results of university-level research optimally, the schools should found their own evaluation and patent departments. These could function as intermediaries and negotiating partners for business and industry.

Winnacker expressed harsh criticism of the media and politics. The media representatives summarily judge everything that has to do with genetic engineering experiments. "The halo of a collective ignorance suddenly becomes the standard for all things," Winnacker said and asked whether in truth this "scribbling" is actually a method. Control and responsibility by the scientist are needed. But when the result of political actionism, the density of regulations, lets the marginal utility become so tiny that the alleged gain in assurance represents nothing but more window dressing, then things are getting serious, Winnacker admonished.

Meanwhile, Dagmar Schipanski, professor of electrical engineering, pleaded for new concepts in the management of higher education. With respect to the shortages of equipment, particularly in the eastern schools, soliciting for third-party funding often ties up the teacher's potential too much. Even with the best intentions, there often remains no time to prepare for lectures in such a way as would be proper. A series of tasks, particularly in management, which, under the present personnel structure, the professor himself must undertake, could be transferred to scientific personnel with long-term employment, said the professor from Ilmenau Technical University.

FRG: Expert Criticizes Research Budget Cuts, Views Nuclear Fusion Research

93WS0475A Bonn *DIE WELT* in German 10 May 93
p 9

[Interview with Prof. Klaus Pinkau, director of Max-Planck Institute for Plasma Physics in Garching, by Norbert Lossau; date and place not given: "Nuclear Energy Will Experience a Renaissance"—first two paragraphs are *DIE WELT* introduction]

[Text] Since 1981, he has headed the Max-Planck Institute for Plasma Physics in Garching: Prof. Klaus Pinkau (62). The goal of his work is the development of a fusion reactor which, modeled after the sun, will utilize the virtually inexhaustible energy produced by the fusion of hydrogen atoms. In this interview with *DIE WELT*, he warns [the government] not to make cuts in major research projects as a consequence of its cost-cutting policy. He says that this policy has been making it impossible for research institutes to make a "soft transition": "They're pushing us off the cliff now."

Prof. Klaus Pinkau was born in Leipzig in 1931. Originally, he was trained to be a repro photographer. Later, in Tuebingen, he studied mathematics and, in Hamburg, physics. His science career began with nuclear physics,

after which Pinkau devoted himself to astrophysics. From 1972 to 1977 he was director of the Max-Planck Institute for Extraterrestrial Physics in Garching near Munich. Following that, he once again changed the focal point of his scientific endeavors. Since the early 1980's, he has devoted himself to research on nuclear fusion. He was a member of the Science Council, chairman of the European Space Agency (ESA) advisory committee, headed the Ministry of Research's "Major Basic Research Projects" committee of experts in 1980, and chairman of the Berlin Academy of Sciences founding committee. Pinkau is today regarded as one of the foremost authorities on German research policy.

[DIE WELT] The German research scene seems to be suffering from the financial burden of national reunification. Is the quality of research as it is conducted in the major research institutes in danger?

[Pinkau] The major research institutes consume an important part of the total Ministry for Research budget and have for this reason been criticized for decades. The criticism comes from the science sector itself, from the universities or the German Research Council (DFG). This has no doubt played a role in arriving at the decision not to use the available means for the major research institutes in the new federal states to the same extent as in the old ones.

However, we must, of course, recognize the fact that, since certain research problems can only be solved with large concentrations of personnel, major research facilities are indispensable for such projects. But university research had atrophied in the former GDR. This is why we have increasingly been trying to affiliate the former GDR academy institutes with universities.

It appears to me, however, that the entire research sector is affected by the fact that there seems to be a consensus that research is one of those fields that should not be allowed to grow proportionately to the expanded national budget in view of the economies that are at present necessary. In Germany people obviously think: Although the population increased by 25 percent following German reunification, the research budget need not grow commensurately with that increase.

This means: Because of the nation's heavy financial burden, we here in the West have to cut back on research so that we can support the additional burden in the East.

[DIE WELT] But you don't endorse this view?

[Pinkau] Not permanently, at least. Cuts may be temporarily necessary to get through difficult situations. But after—let's say—two years, there doesn't necessarily have to be any permanent damage. But, if it's burning now, if roads and sewage plants have to be built right now in the new federal states, everyone recognizes the fact: This is an emergency situation. If your house is burning, you've got to put out the fire first.

[DIE WELT] And what will you do when the fire is put out?

[Pinkau] If research is not once again assigned greater importance in the long run and assumes a lower position on the scales, dangers will lie in wait for us: For one thing, the importance of science and research for future jobs or, even more generally, for the survival of our society might be underestimated. Secondly, here in the West effective research will have to be abandoned, research that will not so quickly be regained in the new states.

New Ones Have To Be Slipped Under Cover of Old Budget

[Pinkau] Research is not conducted by locking a given number of people in a room and saying to them: "Be productive now!" You can't expect the same results that the researchers who had to be laid off in the old federal states would have arrived at to be available next month.

[DIE WELT] So, specifically, how does it look with respect to the cuts in the old states, Professor Pinkau?

[Pinkau] The cutbacks for the individual institutions will amount to as much as 20 percent. This is due to the fact that the budget for research at the individual German institutions has increased at a far lower rate than the one at which the total federal budget has. Therefore, new [projects] have to be covered by the scarcely increased old budget. This budget has now become too small in all respects. Scientific institutes' output will be smaller because the structures that have been operating successfully will have been cut back in the old states.

[DIE WELT] How?

[Pinkau] They won't, for example, be able to fill positions that become vacant again, which takes opportunities away from the new generation of scientists and permanently interferes with the institutes' ability to come up with innovations. These economies will probably benefit the new federal states. Despite all our understanding of the situation, we must nevertheless recognize the fact that these measures are not enough and that new concentrations of personnel cannot be built up fast enough to anywhere near compensate for the cutbacks in the West with redevelopment of the East.

[DIE WELT] And your institute? What concrete action are you taking in this situation?

[Pinkau] Our institute has, for example, opened a branch in East Berlin. In this way the potential of new generations of scientists can be optimally utilized and a chair for plasma physics instituted at Humboldt University in Berlin. But these additional colleagues cannot offset our losses. The inroads cannot be compensated for here in the west through a certain degree of redevelopment in the East. The overall research potential of our institute won't be retained.

[DIE WELT] How large are the cuts in your budget?

[Pinkau] Our institute's investment budget for 1993 will be DM10 million—that's about 30 percent—short. And since, with the projects we invest in, we receive DM1 from the European Community for every mark we get from Bonn, our shortfall is doubled to as much as DM20 million. Because of this, the Federal Republic of Germany does without supplementary financing by Europe.

Lawnmower Is Wrong Stringed Instrument

[DIE WELT] On the other hand, the Ministry for Research is asking the major research institutes to attract more European money than they have up to now. A contradiction?

[Pinkau] Yes, we've pointed this out to the government in Bonn over and over again. To be sure, as a citizen, by and large I can understand what is happening now. If we don't help them in the East, more and more businesses will close down. It can't be in our interest for social peace to be destroyed. Just as little can it be in our interest to weaken the economy or our currency. That's why I think that the first thing for us to do is to try to reduce government expenditures. And, as director of an institute, I too try hard to help. But when this is done globally, "with a lawnmower," enormous damage is done in some places.

[DIE WELT] What alternatives do you think there are?

[Pinkau] It seems to me that it's possible to achieve both of them by appropriately changing the way research is structured: That is, by, on the one hand, limiting Germany's total expenditures for fusion and at the same time retaining critical mass by a sufficient concentration of personnel so that we can continue to participate in worldwide fusion research with relevant results.

[DIE WELT] And can this concept be applied in this form to other major research institutes without further ado?

[Pinkau] That's just my point. You can very well view fusion research as a model example of the ways of going about this, which as I see it are inevitable. We must reduce parallel research and concentrate our research on those areas in which it is minimal in size and shows promise of new results important for the future. This quite generally holds true. If we want to, on the whole, reduce research efforts in the old federal states, we must at the same time muster the political power to implement this structural change.

[DIE WELT] How much time would the major research institutes need?

[Pinkau] When the first reports of the cuts reached us in 1991, the chairman of the committee on major research institutes, Professor Kroell, said to the minister at that time, Mr. Riesenhuber: If you give us time and the figures we are aiming at, and support us, we could complete the reorganization in five years. But we weren't allowed to make use of this soft transition. Instead, we're

being pushed off the cliff today. The more short-term changes are imposed on us, the more damaging the consequences will be.

There's No More Fat To Be Trimmed Here

[DIE WELT] But you'd be willing to tighten the belt for a certain amount of time—say, two years?

[Pinkau] Yes. But, in addition to the fact that the political power is lacking, my concern is to create the conditions that will again permit productive research.

[DIE WELT] Former Minister Heinz Riesenhuber described the economies imposed on major research institutes as a necessary trimming of fat. To stick with the same metaphor, after this diet we would have had to deal with more muscular research institutes.

[Pinkau] You know, at least as our institute sees it, this metaphor is wrong, completely wrong. More specifically, we already went through this diet all through the 1980's.

Cutbacks were then imposed on us for 10 years with losses of from 10 to 11 positions a year. We've already trimmed all the "fat" we can in our institute. This is why, as early as at the start of the 1990's, we said: We're now only bones. If we're cut back any more, our bones will break.

[DIE WELT] Who can say, just like that, where flesh ends and bones begin?

[Pinkau] First, we're perfectly well supervised. As a participant in the European fusion program, we have to obtain permission for each project, each procedure, each experiment in a multiphase assessment process. The Max-Planck Society's outside technical consultants also regularly check on why and how we did what. We're so thoroughly investigated that there's really "no more fat to be trimmed."

Second—and this seems to me to be more important—with both of its lines of research, Divertor-Tokamak and Stellarator, our institute has worked out completely new fields of knowledge recognized worldwide. We pursue these two important lines of research with 90 percent of our staff. We use 10 percent of them for basic research in general, an important prerequisite for a sufficiently broad field of vision. If we are further reduced, the critical mass in personnel required to be able to conduct research on fusion will be endangered.

Last Uninvestigated Source of Energy

[DIE WELT] If, in spite of these arguments, drastic cuts should be imposed on your institute, don't you suspect that fusion research in general, the dream of an inexhaustible source of energy, will have lost its appeal and credibility? Are there political doubts as to your research goals?

[Pinkau] If that's true, it has to be publicly stated. And the responsibility for doing so must be publicly assumed as well.

The energy problem is so big and the solution to it so difficult that we view ruling out one of the very few options for the future, like fusion, at this time as an irresponsible act.

Let me go into the argument involving costs: The minister for research annually allots DM200 million for fusion research. This is about 15 percent of the energy research budget; 22 percent of it is for research on existing renewable sources of energy, 10 percent for coal, and the rest for nuclear energy. Fusion research accounts for just 2 percent of the minister for research's total budget. Let's compare this with the cost of supplying energy: Germany annually spends more than DM200 million on this. The amount spent on precautionary research on fusion comes to exactly a thousandth of this expense. If people say that fusion research is expensive, well, that's a very relative matter.

Furthermore, it's readily understandable why fusion research is complicated and therefore not cheap. Namely, it's the last uninvestigated source of energy. What's left over is always the most complicated.

[DIE WELT] The main supply of energy today is ensured by petroleum....

[Pinkau] ...and that is becoming increasingly harder to find. If you take a look at the map of the world, at where petroleum comes from, all of it is concentrated in the Persian Gulf. There have already been considerable difficulties in the past in connection with this unique world supply from a single region. But the only substitutes for oil and natural gas are nuclear fission, solar energy, and perhaps fusion. There are no options other than these three.

[DIE WELT] But people do not yet realize this.

[Pinkau] In assessing these options, we mustn't base the relative importance of the different forms of energy on present-day public opinion. We have to imagine what public opinion will be like in 10, 15, or 20 years from now when awareness of the energy problem has reached the public. Namely, the public has no memory; it changes its opinions as the circumstances change. Then the politicians sit in the dock and are asked: So what precautionary measures have you come up with in 1993?

[DIE WELT] And here we get to what is precisely the—decisive—political question....

[Pinkau] Yes, the decisive question for a politician must therefore be: How shall we ensure our future and define a reasonably acceptable standard of living that is high enough to avoid the destruction of our country through social unrest? Because an unreasonable increase in the cost of energy or an inadequate supply of energy could lead to intolerable social tensions for us.

Subsidies Discontinued, Market Collapses

[DIE WELT] Critics of fusion research favor the use of solar energy.

[Pinkau] Solar energy has one big advantage over all other forms of energy: Once it has attained a certain degree of cost-effectiveness, it can fill markets, as it were, immediately. When it's expensive, solar energy will only be used in watches; when it's cheaper, it'll be used to provide energy for automatic traffic signals and mountain huts, etc. Every reduction in the cost of solar energy will automatically lead to an expansion of the solar cell market. This is why there is really no need to worry about developing solar energy.

On the other hand, the oft-expressed view that its introduction into the market should be artificially accelerated and that the industry be induced to mass produce solar cells through government-supported reduced prices and subsidies doesn't seem to me to be a promising approach. This has been tried and it has not proven successful.

[DIE WELT] You mean the market didn't take the bait?

[Pinkau] No, it didn't. When the government subsidies are discontinued, the market collapses. This applies—at least today—not only to solar cells, but also to windmills, etc. Therefore, to ensure our energy supply, a situation could arise in which thereintroduction of nuclear energy is unavoidable if social tensions in Germany are to be kept at a sufficiently low level.

[DIE WELT] So there will probably be a rebirth of nuclear energy since the other sources of energy will be depleted before solar energy and fusion power plants are operational?

[Pinkau] Yes. If other sources of energy aren't available, it is precisely ordinary nuclear fission reactors that will again have to increasingly be employed. Whether we like it or not.

[DIE WELT] So you get to hear from the nuclear energy lobby that we wouldn't need any fusion reactors at all if we placed our bets on nuclear energy.

[Pinkau] At any rate, it makes sense to introduce fusion power plants into the energy economy once they are developed. The reason for this is their favorable safety characteristics. First, the amount of energy contained in a fusion plant is so small that the plant can be built employing passive safety devices. A fusion reactor can never melt down. Second, the half-life of radioactive fusion waste materials is substantially shorter and its toxicity much lower than is the case with fission waste. Therefore, it is in one's interest to introduce fusion as well into a nuclear fission economy at any point in time. If a major technological application of solar energy should become possible, the same would apply to it.

EC Commissioner on Fourth Framework Program

93WS0479A Paris AFP SCIENCES in French
29 Apr 93 p 1

[Article: "European Commission Seeks To Commit 13.1 Billion ECU to 1994-1998 Research"]

[Text] Strasbourg—The European Commissioner for Research, Mr. Antonio Ruberti, announced on 22 April that the European Commission will present to the Twelve a proposal calling for the commitment of ECU13.1 billion in Community credits for research, development, and technology during the 1994-1998 period. "Research can and must play a leading role in the stimulating of growth and improvement of the quality of life in the Community," said Mr. Ruberti.

The Commission has defined 28 areas of action that will receive EEC appropriations stemming from this fourth research framework program. According to Mr. Ruberti, the EEC plans to focus its outlays on industrial research. He also defined new sectors into which the Community should channel research funds.

Research on training and education must be undertaken, he said, so as to improve the level of preparedness of the Europeans, and on the mobility of researchers. The Commission also suggests developing research on transport, and particularly on the complementarity of transportation systems.

Mr. Ruberti also spoke of the need for improved coordination of research outlays in the EEC. The Community, he said, suffers from the "fragmentation of national policies." This is a handicap with respect to its Japanese and American competitors. And all the more so in that, according to the Commission's figures, Japan and the United States, in 1991, devoted 3 percent and 2.8 percent of their GDP [gross domestic product] respectively to research, versus the EEC's 2 percent.

Mr. Ruberti called for "an improvement in the diffusion and utilization of the results of research" and for more intensive integration of research efforts in Europe. Of the total governmental spending allocated to research by the 12 member states, less than 4 percent goes into joint research efforts undertaken under Community policy.

The Community's fourth framework program, said Mr. Ruberti, is not intended to add to national programs, but rather "to contribute to the instituting of a full-fledged Community research policy." This framework program will be submitted to the research ministers of the Twelve on 29 April at Luxembourg.

France: CNRS Seeks Improved Science Research

93WS0479B Paris AFP SCIENCES in French
29 Apr 93 p 2

[Article: "Second Plenary Session of National Scientific Research Committee, at Strasbourg"]

[Text] Strasbourg—The second plenary session of the National Scientific Research Committee, meeting in Strasbourg on 22 and 23 April, has formulated 12 proposals for energizing science research in Europe, which is currently undergoing a "growth crisis," according to Mr. Francois Kourilsky, general director of the National Scientific Research Center [CNRS].

Some 700 researchers, at six round tables, have debated the subject of "European Research and Its Outlook," and have proposed, in particular, the founding of a "European research club" that would bring together researchers, laboratories, and institutions. "Let us give thought jointly to this 'Europe of science,'" said Mr. Kourilsky in his concluding address at the close of the session.

"The scientists should be given a say," he said. This say should be diversified. Indeed, the participants in the congress stressed the need for multilingualism. "A researcher must be at least trilingual; this must be a training priority" in the research organizations, one of the proposals emphasizes. "We still have a long way to go!" exclaimed the CNRS's general director, remarking that many of the foreign participants in the congress, contrary to many of their French colleagues, already master several foreign languages.

The Committee also stressed the importance of scientific cooperation with the nations of Central and Eastern Europe as well as with the southern European nations. It recommended "providing for the reinsertion and development of research in its country of origin," when awarding a research grant to a researcher from one of these countries.

The scientists also advocated the working out of a "personnel statute for grant-holders and researchers," and the utilization "of the potential and diversity" of Europe, to attract the young toward research-related occupations. In the course of these debates, according to Mr. Kourilsky, a "consensus against bureaucracy," particularly European bureaucracy, has emerged, as well as the scientific community's need of movement. "We must move about more, better, and less expensively," said Mr. Kourilsky, asserting that everything will be done to try to lower the "scandalously high" cost of air transportation in Europe.

The Committee's 12 proposals must now be submitted to the minister of higher education and research, Mr. Francois Fillon. In his opening address at the start of the congress, Mr. Fillon stated that the work of the Committee would be an "essential factor" in his thinking.

The minister also stated in his address that "the higher education and research appropriations would be maintained in the new budgetary amendments act. The new act is not expected to include any reductions in these two sectors," he said, adding that higher education will be given a "very high priority" in the new budget.

In another regard, the minister confirmed his intention to "give universities the greatest possible independence," citing "measures to permit them to manage their own budgets." Mr. Fillon also pointed out the "current risk of the Community dynamic's bogging down" with respect to research, owing, according to him, to a "phase of question-raising as to the destiny of Europe of the Twelve."

France: New Environmental Anthropology Lab

93WS0479C Paris AFP SCIENCES in French
25 Apr 93 p 3

[Article: "Creation of a New ORSTOM-University of Orleans Laboratory"]

[Text] Paris—The ORSTOM [Office of Overseas Scientific and Technical Research], the University of Orleans, the Central Region Administration, and the City of Orleans, have signed a statement of intent to create a 70-person research laboratory at the University of Orleans. The signature took place on 21 April.

The laboratory will study the interactions between human societies and natural environments, with a view to developing scientific indicators on which those responsible for development can base their operational decisions. The interdisciplinary research will focus essentially on the intertropical zone, and will contribute to analysis of the accelerated transformation of environments under the impact of economic and social development, says ORSTOM. This research will support a doctoral program in environmental anthropology that has been instituted at the University of Orleans. The laboratory and doctoral program will take in 25 scientists from the developing countries.

The local administrations will provide 50 percent of the financing of this laboratory. Its design and construction will extend from June 1993 to September 1995.

Germany: Bundestag Budget Committee Releases Eurofighter Funding

M10906132293 Munich SUEDEDEUTSCHE ZEITUNG
in German 13 May 93 p 6

[Text] Despite opposition voices, the Bundestag Budget Committee unblocked 150 million German marks [DM] for development of the European Fighter Aircraft Wednesday. This means that all this year's budget's development funds have been released and according to a Defense Ministry report will already have been spent by June. Hardthoehe is still negotiating with the industry about development financing for the second half of 1993.

Defense Minister Volker Ruehe said after the Committee meeting that "in this year of modest means" the industry would in the end have to adjust. If no agreement were reached on the development of the project as a whole and on reducing the unit price for the Eurofighter,

he would have to make a political reappraisal. Ruehe renewed his threat not to buy the aircraft once it was developed, if the price were not cut to 30 percent of the original estimate. "It is a waste of time just reusing the old contracts," Ruehe said. "there is no majority for the old aircraft in the Bundestag."

SPD [Social Democratic Party of Germany] Defense and Budget Spokesman Horst Jungmann said he was afraid the defense budget "would be bankrupt" in September when new accounts for the fighter were due and the costs of Bundeswehr deployment abroad could no longer be paid.

Ruehe's strategy is first to make binding agreements with industry, Deutsche Aerospace in particular, to slow down development and cut the price of the fighter before deciding on development costs for the second half of the year. His most powerful means of bringing pressure to bear is that he will not be deciding on procurement until 1995. Ruehe has come a step closer to his objective now that Great Britain is no longer insisting that preparation for production should start in 1994. Hardthoehe could absorb some of the costs for the second half of 1993 by restructuring its budget. But no decision has been taken yet. It is also considered very likely that the industry will prefinance certain costs.

Appointment of New German Research Minister

Political Situation

BR0206083093 Munich SUEDEDEUTSCHE ZEITUNG
in German 14 May 93 p 20

[Article by Thomas Froehlich: "The 13th Research Minister Came on the 13th"]

[Text] Being appointed on the 13th of the month as the 13th research minister after his predecessor had served 113 days in office, the new Federal Minister of Research and Technology (BMFT) had every reason to express the hope, as he took office at the ministry yesterday morning, that the above circumstances would not be an "evil omen" for him. For almost all present at the staff meeting at the ministry, it was the first time that they had encountered Matthias Wissmann's successor. The 43-year-old CDU [Christian Democratic Union] deputy from Mecklenburg-Western Pomerania, a member of the Research Committee from his election to the Bundestag in 1990 until March 1993 and, since then, his party's spokesman on Trust Agency policy, has not kept a high profile in Bonn, which is perhaps why his first appearance before the television cameras and notebook-brandishing reporters was such a success.

Staff council chairman Herbert Roemer took the opportunity to state in a what was at times complacent address that the news of the change of office had hit the ministry "like a bombshell" the previous week. The 113-day minister Matthias Wissmann, now Transport Minister,

would go down in the annals of the Research Ministry as the incumbent who—to date—had achieved the “shortest term of office.”

Wissmann and Krueger, the outgoing and incoming research ministers, could hardly be more different types: On the one hand Wissmann, the dynamic, eloquent political pro, who admits that he would have liked to remain at the Research Ministry but who had to comply with the chancellor's call of duty, and, on the other, the self-effacing Krueger, who received a round of applause when he confessed, with the artlessness still typical of eastern German politicians, that he was “not good at speaking.” “Three years in politics have not been enough to get me used to it,” Krueger, who holds a doctorate in engineering, did well not to announce any trailblazing new strategies on his first day. Basically, he said, he wanted to carry on where Wissmann had left off, although he would also be setting priorities of his own. Krueger, too, feels that research and technology have lost status both in politics and among the wider public, in spite of the fact that research policy is of “great significance” for the German economy. In 1994, Krueger wants to “gird his loins” as regards the research budget, which amounted to about 9.6 billion German marks in 1993. Industry would have to play a greater part in financing the controversial Transrapid magnetic railway (“We want the Transrapid”).

Wissmann left the Research Ministry with a few items that ought to come in handy in his new post. Staff council chairman Roemer presented him with the original paraphernalia of a German Federal Railways station master: red cap, signaling disk, and whistle, all of which, he said, would be of immense help when giving the Transrapid the green light as transport minister.

Krueger's Profile

MI0206084793 Bonn DAS PARLAMENT in German
14-21 May 93 p 16

[Article by Guenther Pursch: “Topical Portrait: Paul Krueger Is New Federal Research Minister; Meteoric Rise Since Unification”]

[Text] Matthias Wissmann was Federal Minister of Research and Technology for just 100 days before he had to leave this high office: Federal Chancellor has appointed him as successor to Transport Minister Guenther Krause, who has resigned following a series of scandals. Wissmann has thus climbed another rung up the career ladder in the Federal Cabinet hierarchy.

Wissmann's own successor is CDU [Christian Democrat] politician Paul Krueger, born in Guestrów in March 1950 and a resident of Neubrandenburg. The Federal Ministry of Research and Technology is now led by a man who, after attending the Polytechnic High School, was apprenticed as a lathe-operator from 1966 to 1968, a job he held from 1968 to 1969 in Teterow and Warnemuende. He then studied engineering at Wismar College of Technology, graduating as an engineer in

1975. He gained his doctorate in engineering in 1986, and from 1980 he led the organization and software development team at a Neubrandenburg engineering company.

In 1966 he joined the Free German Labor Union Federation (Metalworkers' Union) in the former GDR, which he left shortly before the peaceful revolution. A practicing Catholic, he is not one of the CDU's “old hacks”: As a member of a small religious opposition group, his political involvement in the CDU at the time of unification began only at the end of 1989. What followed was a meteoric political rise for Paul Krueger.

Early in February 1990, a small group of journalists, sponsored by the Konrad Adenauer Foundation, were traveling through the GDR, one of their destinations being Neubrandenburg in Mecklenburg-Western Pomerania, where their agenda included discussions with local and regional CDU leaders. The “local secretary” introduced the interested western observers were to some members of the campaign staff for the forthcoming Volkskammer [GDR parliament] elections in March. They proudly reported that there was now a totally new local party leadership. Between December 1989 and the beginning of February 1990, the CDU in particular had recruited over 40 new members from the Catholic church, including the three campaign staff present. According to the local secretary, the CDU had made itself attractive to Catholics in the still-existing GDR because of its continuing commitment to Christian values.

At the time of this interview—there had long been talk in the West of the election campaign “heating up”—western journalists asked the local secretary in the CDU's sparsely furnished meeting room how the selection of candidates for the election was progressing. For example, were new, fresh people running for office, or were the old hacks still being put up as candidates? She hummed and hawed for a while, before glancing at Paul Krueger, sitting on her right; she then replied in the still-prevalent obscure party idiom that, though the “party cadres” had not yet reached their decision, she personally had her own views: There should be a fresh candidate, untainted by a party-machine past. However, the person she had in mind did not know of her plans. This intrigued the west German journalists, who took the bait: Was her chosen candidate present, they asked? This time, the pause was longer, before she again glanced to the right: Though no proposal had yet been submitted to the party cadres, she felt the best candidate for the new, transformed CDU was the totally flabbergasted doctor of engineering and software developer now talking to the journalists—Paul Krueger, from Neubrandenburg.

The rest is history. Paul Krueger entered politics, becoming a member of the first freely elected Volkskammer at his first attempt. As chief parliamentary whip, he supported the work of the parliamentary CDU/DA party chairman: Guenther Krause, who has just resigned.

After unification, Krueger immediately joined the executive of the CDU/CSU [Christian Social Union] Bundestag group, soon rising to become chairman of the Mecklenburg-Western Pomeranian CDU Bundestag group, with Krause acting as spokesman for all CDU deputies from the new laender.

While an ordinary deputy, he served on both the Bundestag Research and Technology Committee and the Transport Committee. He was certainly not one of the CDU group's publicity-seekers, being by nature more reflective and assiduous in his working methods. For all that, Helmut Kohl's term could well be used of him: It would not be derogatory to describe him as a political stage manager operating in the wings in Bonn. For some time now, his name has been bandied about in the CDU/CSU group as a potential minister from the new laender in the event of Krause's resignation. Only the most casual observer could have been surprised by Krueger's appointment to succeed the 100-day research minister.

Party Reactions

MI0206084193 Bonn DAS PARLAMENT in German
14-21 May 93 p 1

[Text] Following Federal Transport Minister Guenther Krause's resignation on 6 May, speculation about his successor ceased with the appointment the same evening of CDU [Christian Democrat] politician Matthias Wissmann as new transport minister. Wissmann had only recently been appointed as research minister. Federal Chancellor Helmut Kohl named his successor in this post as Paul Krueger, CDU Bundestag deputy for Neuland Brandenburg.

Krause's resignation followed several scandals, the final straw being recent accusations that he had wrongfully gained approval for his removal from Berlin back to Boegerende, his hometown in Mecklenburg. His resignation was widely welcomed as "long overdue." Krause has not, however, resigned his posts as land-level CDU chairman and Bundestag deputy, though he has now also come under pressure from his land party association. Schwerin Environment Minister Frieder Jelen (CDU) calling on him to resign all his party jobs. Minister-President Berndt Seite's reaction to the suggestion that he should take over as land chairman was that he "had his hands full" as minister-president, though it remains uncertain whether the situation will change following the meeting called for this weekend to consider the allocation of posts in the Mecklenburg-Western Pomeranian CDU executive.

Wissmann's appointment as transport minister has generally been favorably received: SPD [German Social Democrat Party] transport spokesman Klaus Daubertshaeuser stated that Wissmann's background was far broader than that of many other candidates, as economic and science policy, for which he was previously responsible, had a great deal in common with transport issues.

Paul Krueger's appointment as new research minister met with incomprehension and displeasure from the FDP [Free Democratic Party] and the opposition, as he is regarded, at least in Bonn, largely as an unknown entity. According to FDP Bundestag research spokesman Karl-Hans Laermann, "Research and technology are obviously no longer considered major policy areas in the debate on Germany as an [industrial] base."

Wissmann and Krueger, who are due to be sworn in on 13 May, were "totally surprised" by their appointments. Wissmann's "overwhelming priority" for action is reform of the railroad system; he did not rule out the possibility that reform would lead to "certain price increases" for car drivers, without which the "enormous task" of restructuring could not be paid for. As new transport minister [as published], Krueger plans to press for increased funding for research and development in the new laender, particularly for medium-sized firms.

Policy Discussed

MI0206085193 Bonn DIE WELT in German
22 May 93 p 2

[Article by Diethart Goos: "Research Minister Fights for Made in Germany"]

[Text] Paul Krueger, the new federal minister of research and technology, is setting to work without ambitious projects and high-flown plans. The CDU [Christian Democratic Union] politician from Mecklenburg-Western Pomerania explained to DIE WELT that his guiding principles are practicality, application-orientation, and financial realism.

Paul Krueger sees research funding as investment in the future. "I therefore hope that my ministry's budget remains at least the same size as those allocated to my predecessors. Heinz Riesenhuber and Matthias Wissmann. To put it conservatively, I hope that we shall not have to make any sacrifices in spite of the stretched federal budget."

For Krueger it is crucial that the "Made in Germany" label should not lose ground. "We are way behind the top nations in basic research. However, we must not lose sight of conversion, the practical application area." Innovative and exportable products should also not be the only end in view. Pivotal aspects of life such as health and the environment should have a higher profile in research. There was considerable ground to be made up in this respect, especially in the new laender, which were currently generating only 2.5 percent of innovative export products.

Money alone was not the only decisive factor. "We must rather provide a greater incentive for people to engage in research and development." The Academy of Sciences dominated the research scene in the eastern laender, where industry-oriented research had fallen behind.

"Before unification, this sector employed 130,000 people, but the number has now dropped to only 20,000."

Krueger will not be pinned down on the future of German space research, although he lets it be known that he has reserves as to the recently concluded billion-mark D-2 mission on an American shuttle.

"We cannot ignore the fact that 85 percent of the population is opposed to space travel, and we must therefore reconsider whether it still holds out long-term potential." When the fundamental decision came to be made, the many positive spin-offs of space missions, primarily in the environment, transport, and telecommunications sectors, should not be overlooked. "Overall, we should aim for targets that in the ultimate analysis benefit the human race." Krueger sees a good chance of beating the Japanese and American competition to win the multimillion project on the pioneering fusion reactor for Germany. However, he will first need to win the agreement of the SPD [German Social Democratic Party] to nuclear fusion.

Netherlands: Government HD-MAC Subsidies to Philips Canceled

BR0806143193 Rijswijk POLYTECHNISCH
WEEKBLAD in Dutch 21 May 93 p 3

[Unattributed article: "Philips No Longer Asks For Subsidy"]

[Text] This year, in consultation with the Ministry of Economic Affairs, Philips has submitted a modified subsidy application for HDTV [high-definition television]. This is a consequence of the uncertainty regarding the future of advanced television systems in the European Community. This is particularly the case for the European [analog] HD-MAC standard, which has already been adopted and which is once again hanging in the balance.

For this reason, Philips is only receiving a government subsidy from Economics Minister Andriessen for HDTV activities unrelated to HD-MAC. The same applies to the JESSI [Joint European Submicron Silicon Initiative] project section for developing HD-MAC decoders, for which Philips is no longer requesting a subsidy from the Economics Ministry. The government contribution for high-definition television will remain at 15 million guilders this year.

This year, the minister wants to keep technology subsidies for Philips at 100 million guilders, as is clear from a letter sent to the Second Chamber.

In addition to the 15 million guilders for HDTV, the 100 million guilders are divided up as follows: 27 million guilders earmarked for Philips' participation in the JESSI European chip program, a reduction of 3 million guilders compared with 1992; 35 million guilders for the

Liquid Crystal Displays (LCD) project; 8 million guilders for consumer IC's [integrated circuits]; 11 million guilders for Mechatronics; and 4 million guilders for Radiology 2000.

The LCD project covers liquid crystal research for large screens and the improvement of production techniques. Radiology 2000 focuses on CCD [charge-coupled device] image sensors for X-ray detection, magnetic resonance, ultrasound, and sophisticated medical image processing. The Mechatronics project is involved in reducing the size of systems and user interfaces. The Consumer IC's project covers CAD [computer-aided design] tools and design processes for new components. A Philips spokesperson says that Minister Andriessen's contributions for the six major technology projects were "as expected."

Germany: Wuerzburg University Opens Life Sciences Center

MI2806130693 Munich SUEDEUTSCHE ZEITUNG
in German 22/23 May 93 p 50

[Article by Wilhelm Hilpert: "Ten Departments Under One Roof—Wuerzburg University's New Life Sciences Center Officially Opened"]

[Excerpts] Wuerzburg University's pride and joy is the Life Sciences Center that occupies a leading position in Germany. The idea behind it is to bypass faculty divisions and bring together under one roof subjects that have many methodological and conceptual points in common in both research and theory. Ten departments are, so to speak, cohabiting: six in biology, one in chemistry and three in medicine.

Interdisciplinary Work

There is scope for a broad spectrum of research, for example genetics, microbiology, biochemistry, and human genetics. This science center houses lecture theaters, a library, animal pens, and technical equipment. The combination of disciplines makes for economic use of the costly, large-scale apparatus and for better administration. It cost 100 million German marks [DM] to build. Scientific work has already been under way at the center for a year, but the research program has now been officially opened in the presence of Federal Education Minister Rainer Ortleb and Bavarian Education Minister Hans Zehetmair.

In his address, University President Theodor Berchem paid tribute to the Life Sciences Center's pioneering role in both research and teaching. He recalled that back in 1984 the Science Council had called the project "an impressive scheme." Planning and consultations had taken 20 years. At the laying of the foundation stone in March 1986, the then minister-president, Franz Josef Strauss, had said that the project would overcome "scientific provincialism."

Wuerzburg University had decided to make life sciences one of its key research areas, and staff and equipment

had been provided accordingly, Berchem said. The fact that scientists from the Life Sciences Center were currently participating in three special research programs in human medicine and one in biology also attested to its international significance.

Berchem stressed the need for more basic research, although applied research should not be neglected either, "lest others reap the benefit after our brains have sowed the seeds." Germany needed to invest in its "gray matter" if it was true that this was the only thing that it had in relative abundance.

Berchem indicated that the two ministers from Munich and Bonn were also to speak, but it was not to be. With whistles, boos, and ear-splitting noise students in the lecture theater protested at the planned cuts in teaching staff, milling about in front of the guests of honor carrying banners. The background to this is that 55 establishment posts are to be cut over the next five years (11 a year). [passage omitted]

The retired biochemist Ernst Helmreich, whose ideas had had a great influence on the Life Sciences Center, then spoke about the center's work.

France: National Molecular Optoelectronics Program Considered

BR1106133493 Paris *ELECTRONIQUE*
INTERNATIONAL HEBDO in French 27 May 93 p 34

[Article by Claire Remy based on a study by the French Advanced Technologies Observatory: "Molecular Optoelectronics Comes out of the Lab"]

[Text] Molecular optoelectronic devices are already with us and examples such as liquid crystal displays and photosensitive resins are in common use in industry. However, upon reflection, the OFTA [French Advanced Technologies Observatory] believes that a well-considered strategy and coordination between national research programs in this field are needed if further progress is to be made.

"The control of the molecular level and the ability to customize are the essential advantages of a molecular approach to information technology," explains Joseph Zyss, head of the Quantum and Molecular Electronics Department of the CNET [National Center for Telecommunications Studies] in Bagneux, France, and coordinator of the molecular optoelectronics working group at OFTA. (In order to expand the scope of molecular optoelectronics and coordinate research in this field, academic and industrial experts from various backgrounds (electronics, telecommunications, physics, chemistry, and other materials sciences) met in March 1990 at the instigation of Marc Dupuis, a professor at Paris-VI university, to form a molecular optoelectronics working group within OFTA. Three years later, this group has just completed its deliberations, which are summarized in a report entitled "Arago 13" (published by Masson.))

"Molecular electronics uses an approach which reverses the one pursued in the field of semiconductors. It presupposes a perfect control of molecules at the microscopic level and makes it possible to produce made-to-measure components with the required electronic and optical properties," he says. Organic molecular materials have already found many applications in optoelectronics, from liquid crystals to optical sensors, via photochromes, photoconductors, photosensitive resins, etc. Various components already exist or, at the very least, have been made in the laboratory. However, after studying the various fields of application for molecular optoelectronics and performing a feasibility study with such devices, the OFTA working group is recommending a well considered approach to these areas and the coordination of ongoing research programs within a national program, similar to those launched by MITI [Ministry of International Trade and Industry] in Japan, if further progress is to be made. The most important component to be made of molecular materials is the optoelectronic modulator: It is the interface between optical and electronic components and is the key optoelectronic component for fiber-optic communications. The material currently used in optical modulators is lithium niobate, but its manufacturing cost is prohibitive, which means it cannot be used for private phone subscribers. The implementation of molecular materials would reduce the bottleneck and allow the wide-scale application of optical fibers.

Molecular optoelectronics research can be conducted at various levels, e.g., the molecular level, the material level, and, finally, the level of material formatting. The first level relies on molecular engineering and supplies chemists with the guiding principles of synthesis. The material's characteristics are governed primarily by its order and disorder properties, its symmetry, and its density of active units.

Finally, to format the material, surface (films) and linear (fibers) growth technologies are used, as well as lithography. One of these techniques is organic molecular beam epitaxy, which enables epitaxial layers to be grown which have different characteristics from those of quantum wells.

Many fields of application are envisaged for these devices, both as passive components, such as in fiber-optic technology, and active components, where different memory types are possible: volatile memories, for example, for durable and reversible displays; or non-volatile memories for data storage. Some materials have nonlinear optical properties and can be applied in the optical counterparts of the transistor. Such applications are a genuine possibility because the necessary emitters are already available—ultra-high-speed, easy-to-use laser sources. Molecular-level addressing techniques are also available, for example near-field optical microscopy.

Hybridizing Molecular Components With Semiconductors

However, simple technologies which are compatible with conventional electronics substrates, such as silicon, gallium arsenide, and other III-V semiconductors, have yet to be developed. "The aim is to hybridize the molecular components with conventional semiconductors," stresses the group's spokesperson, rather than recreating the electronics from start to finish. One of the problems lies in developing instrumentation which chemists can use to fabricate components based on silicon, gallium arsenide, and polymers. The traditional schism between physicists and chemists is detrimental to progress in this type of research. Clean room experts are not keen to allow organic molecules into their environment because "polymers pollute." However, this cultural resistance has already been overcome because polymers have for a long time been used in photosensitive resins.

Bangemann on EC Technology Policy

BR2806090893 Brussels XIII MAGAZINE in French
May 93 pp 3-6

[Interview with Martin Bangemann, director general of the EC Commission's DG XIII (information technologies, telecommunications), taken by Anne Eckstein; date and place not given: "DG XIII Objectives and Priorities"; first paragraph is XIII MAGAZINE introduction]

[Text] In the new Commission which took office in January 1993, Dr. Martin Bangemann, vice-president of the Commission, holds responsibility for EC policy in the industrial, information technology and telecommunications sectors. XIII MAGAZINE asked him about the aims and priorities of his new post.

[Eckstein] You, a liberal and a fervent supporter of the market economy, are responsible for developing and implementing a European industrial policy. Are you managing to reconcile your political convictions and the role allocated to you?

[Bangemann] Certainly. Obviously, from the way in which you have put your question, you see industrial policy as a synonym for massive state intervention. Of course that is an opinion which I do not share. Industrial policy is perfectly compatible with a market economy. However, in order to be able to reinforce industrial competitiveness, this market economy must be supported in such a way that its structural development can be accelerated and Europe's forces can be mobilized. This type of industrial policy cannot and will not replace managerial responsibility by a state policy. However, in the future greater attention must be paid to the implications of certain public aims, such as for example protecting the environment or the development of efficient communications infrastructures, for industrial policy.

[Eckstein] Just after you took office, one of the first issues you mentioned in public was that of high-definition television or HDTV. Why do you find this so important?

[Bangemann] High-definition television is of considerable economic importance, while providing a good illustration of the high level of interdependence encountered by modern industrial policy. HDTV involves technological research and development, the manufacture of equipment and of the necessary software (i.e., the programs), and the drawing up and introduction of international standards, not forgetting the balance of power and international relations between Europe, the United States, and Japan. The introduction of a new television system such as HDTV has an influence not only on the production of suitable televisions, but also on the whole sector dealing with the reception and transmission of signals. According to expert opinion, to adapt the TV equipment alone the necessary market volume is between ECU8 million and ECU10 million. You can see that we are talking about a potential "megamarket," which we have every interest in not allowing to slip through our fingers. Particularly since HDTV is considered a new key technology which will have multiple repercussions on various applications in sectors such as medicine, education and training, graphics and printing, to mention but a few.

[Eckstein] How do you plan to bring order to the confusion which currently prevails in this respect?

[Bangemann] In reality the current situation is complicated by the fact that a Commission proposal aimed at promoting a European approach to HDTV did not receive the necessary majority within the Council of Ministers. I will do everything I can to get things moving. We cannot afford to lose a lot of time without running the risk that the analog system currently supported by industry will become outdated before it has even effectively been launched. If there were the least doubt, those involved in the economic cycle should be gearing up to risk a qualitative leap forward and turn forthwith to the development of a fully digital system. If this happened, it would, however, be necessary and pragmatic to have an intermediate stage in which the qualitative development of the existing systems and standards, such as PAL and SECAM, would be continued. Whatever the case may be we will endeavor, in consultation with all those involved in this sector, to use our best efforts to find a reasonable solution.

[Eckstein] Chapter XII of the Maastricht Treaty provides for the construction and extension of trans-European networks, mainly in the telecommunications sector. How do you plan to proceed to fulfill this Treaty obligation?

[Bangemann] We are faced with the not inconsiderable task of designing and implementing the communications infrastructure of the next century. The Commission has an important part to play in this respect, given its power

of initiative and its role as an intermediary. To my mind, the priority of priorities in setting up the trans-European networks is to establish links between national administrations. The aim of this operation is to increase the efficiency of intra-Community communications requirements, which are growing in number in the wake of the completion of the internal market and political integration. At the same time, we should not neglect the problems of data protection and security. By the end of the year, the necessary Council decisions should have been signed, approved, and published, so that the work can begin. The trans-European networks are also at the heart of the efforts we are making with a view to coordinating the introduction of ISDN [integrated services digital network], standardizing mobile communications systems, etc. This is also true for the concept of broad-band integrated communications, which we are pursuing in the context of the RACE [Research and Development in Advanced Communications Technology in Europe] program. All of these programs and initiatives are witness to our determination to ensure that, through our policy, practical applications and research activities tie up. If we have attained these goals to a certain extent it is, among other reasons, because, since the outset, we have worked closely with all the main parties in the sector—network operators, the equipment industry, and suppliers of information services, not to mention potential users.

[Eckstein] You mentioned research activities in the information and communications technology sectors, for which you are also currently responsible. In which direction do you wish to steer the fourth Research Framework Program?

[Bangemann] Already last year, the Commission brought out a working document on the fourth Framework Program. This document is currently before the Council of Ministers and the European Parliament. The Commission is proposing funding in the order of ECU14.7 billion for the 1994-1998 period. This draft will have to be revised in the light of the financial policy decisions taken at the Edinburgh Summit, and corrected if necessary. However, whatever may happen, a considerable proportion of these funds should still be allocated to information and communications technology. In previous years, the corresponding percentage of the Framework Program barely exceeded 40 percent. Do not forget that the document currently being examined by the European Parliament and the Council of Ministers is only a working document, not an official program proposal. It is difficult to say how fast a framework program will be adopted, given that this also depends on the ratification of the Maastricht Treaty, which confers an important codetermination role on the European Parliament. However, I will do everything in my power to ensure that by the end of the year we will have laid the foundations of a European research and technology policy for the coming years.

[Eckstein] Are you yet able to reveal any of the contents of the fourth Framework Program?

[Bangemann] That would be putting the cart before the horse, but I can nevertheless mention some of the principles and basic notions which it contains and which are important in my opinion. First, research policy and promotion should be set in a broader context. In other words, this should make a greater contribution than previously to other Community policies and actions. This is also an aim established by the Maastricht Treaty. Next, funding should be allocated in a more concentrated manner, on the basis of better defined priorities. This is a task which should be worked on by industry, scientific circles, and the Commission. Moreover, I would like to see the procedures for putting forward and selecting projects simplified, with a view to greater efficiency. Furthermore, small- and medium-sized companies should achieve greater efficiency, taking into account their considerable innovation potential in Europe more than anywhere else. However, do not conclude from this that the EC's research programs are mainly designed to promote small- and medium-sized companies. Finally, I consider it important that we do not shrink from any effort to improve coordination through our EUREKA [European Research Coordination Agency] activities, aimed at avoiding pointless duplication and achieving greater synergy.

[Eckstein] One of the aspects of industrial and telecommunications policy is "the regulatory component." With respect to telecommunications, since 1987 the Commission has really acted as a pioneer and has helped to liberalize telecommunications markets to a considerable extent. Will you continue in this direction?

[Bangemann] Without a doubt. For a long time I have been calling for the liberalization of the telecommunications sector, because the state monopoly system is no longer managing to keep abreast of technological progress and the requirements of the market. I do not mean that a pure market economy must be introduced immediately and everywhere. In any case, that would be impossible. I am thinking more of cautious deregulation, which would free market forces while guaranteeing the supply of a service to the whole sector in question and doing justice to the importance of the telephone as a social tool for individual citizens. In my opinion, this is absolutely essential so that, as in other areas, the service sector in the EC can evolve more dynamically than in the past.

[Eckstein] What are your plans for this sector?

[Bangemann] First, I will continue with projects that have already been introduced. This means that initially we will concentrate essentially on following up our proposal to reinforce competition in cross-border telephone services within the Community. On the basis of the remarks we published in October 1992, we have held a series of consultative meetings which have allowed the industry, network operators, users, and suppliers of services to express their point of view. Taking into account the new conclusions which have emerged, the Commission has just submitted a document to the

Council of Ministers. The necessary proposals for directives should follow by the end of the year. The timetable will be more or less the same for the implementation of the Green Paper on postal services, where cross-border traffic will also be exposed to competition. However, our work on turning the Green Paper into law as regards satellite communications and on the preparation of the Green Paper on mobile communications which, I hope, will be finished by the beginning of next year, is also part of the same context.

[Eckstein] Have the legislative measures adopted to date with a view to liberalizing the telecommunications sector already had a tangible effect? If not, at what level could we, and should we, intervene?

[Bangemann] Above all, we should not forget that some of the pertinent directives only came into force on 1 January 1993 and that, consequently, it is rather early to give a verdict on this subject. Let us also not forget that the network operators—which, in Germany, we often rightly refer to as “Fernmeldeverwaltungen” (communications administrations)—have a tradition of monopoly that goes back more than 140 years. It will perhaps not be easy to modify a situation and habits which have become ingrained over the years, but this must be one of our priorities. To achieve this, one of the most important instruments available to us is the series of directives on public procurement agreements. I feel that the potential for technological innovation in this area and for promoting healthy competition remains greatly underutilized.

[Eckstein] Everyone knows, among other things because you were a European member of parliament, that you take a great interest in the role of the EC within the international community and that you have always endeavored to impart new momentum and define new priorities in this respect. Can you, and will you be able to honor this commitment in addition to your new responsibilities?

[Bangemann] Yes. Since Maastricht, the EC has been heading toward a federal Europe, a fact which has no historical precedent. Every aspect which we have mentioned must be set in a global context. This is true of the consolidation of cooperation between the United States and Japan with respect to industrial policy; the approval of strategic alliances between European, American, and Japanese firms; and the regulation of our commercial relations on the basis of transparency and global reciprocity. Naturally, we must avoid restricting ourselves to regulating and further developing our relations only in the context of this triad. Other industrial nations, such as Australia and New Zealand, or the constantly increasing number of countries generally referred to as “threshold countries” also merit our attention. Finally, I would like to emphasize the European Community’s responsibility with respect to the development of Central and Eastern Europe. In the medium and long term, this responsibility will open up undreamed-of development prospects, and not only in the commercial context. Every brilliant idea,

every initiative capable of contributing to the integration of central and eastern European scientists and engineers into the network of cross-border cooperation on research, and every ECU invested in the communications infrastructure in such a way that companies, higher education centers, administrations and other organizations are included in the global communications system, will help not only to relaunch the economies of these countries, but will also contribute to furthering democracy and political stability.

[Eckstein] One last question on the work of the two Directorates-General for which you are currently responsible: Do you think that it is necessary to restructure their organization in order to avoid the pointless repetition of work, generate the necessary synergies, and clarify your political notions?

[Bangemann] It is quite true that we have embarked upon the restructuring of Directorates-General III (internal market, industrial affairs) and XIII. As I do not want to jeopardize my colleagues’ decisions, I will limit myself to explaining the general principles which are guiding our debates. Directorate-General III will be the Commission’s industrial policy department. This is why I consider that it goes without saying that it will be invested with the responsibility for questions of industrial policy formerly dealt with by Directorate-General XIII. This responsibility covers everything relating to standards, as well as the analysis of major technological developments, including their strategic and economic implications. It also covers research being carried out into information technology, as we have always known that its industrial policy aspect was just as valuable as the research and development work in the strictest sense of these terms. In this way I hope that the powers of Directorate-General III will be fully defined. In contrast to this structure, which corresponds to a horizontally oriented industrial policy, Directorate-General XIII will have a more vertically integrated structure, which will mainly involve the telecommunications sector. In other words, Directorate-General XIII will essentially be responsible for all tasks with a bearing on the communications infrastructure in Europe. Its work will include coordination tasks such as those which I have mentioned in relation to ISDN and the GSM [Global System for Mobile Communications]: the adaptation of legislation in this sector in line with the requirements of the internal market; the development of data communications systems on a European scale; and integrated broadband communications. Independently of this work in the telecommunications sector, Directorate-General XIII will remain responsible for the information market, technology transfer, the improved use of research results, and questions relating to applications. I think that our ideas fall in with a certain logic with respect to internal policy and the organization of work. Consequently, I hope that my colleagues in the Commission will approve our proposals, so that we may very soon get down to implementing the new structure. My close colleagues and I are going to do everything in our power to minimize the inevitable losses which result

from any reorganization. I know that I can count on my two directors general, Michel Carpentier and Riccardo Perissich, whose extensive knowledge and constructive cooperation have been of great help to me in planning the reorganization of the departments concerned.

German Research Policy Reorganized

*MI2306091193 Bonn BMFT JOURNAL in German
May 93 pp 8-9*

[Text] The BMFT [Federal Ministry of Research and Technology] is looking to innovation strategies for the future to strengthen Germany's competitive position. Targeted talks between science, industry, and the state about current research policy goals are of central importance here. The BMFT will therefore act as moderator, intensifying the dialogue with science and research in the hope that the state, industry, and science will in future join forces on the fundamental issues of research and technology policy, defining objectives and sharing the ensuing work.

Particular attention will in future be paid to the regulatory context for research and development. Greater care will be taken to preclude possible obstacles to the innovation process when statutory rules are being prepared (assessment of legal consequences). A negative example of this is the Genetic Engineering Act. As a consequence of excessive bureaucracy, only two genetically modified plants were released in Germany in 1992, as compared with 858 in the OECD [Organization for Economic Cooperation and Development] states.

"Strengthening the Competitiveness of the New Federal Laender" is also high on the list of priorities. So far, only 2.5 percent of research-intensive exports come from the new laender. Eastern Germany's industrial research will be further strengthened by creating an infrastructure conducive to R&D, increasing technological competitiveness, forming technology-based businesses, and promoting innovative small and medium-sized firms.

More than in the past, Germany's excellent basic research must be translated into a technological advance bringing competitive market advantages. The BMFT has therefore set itself the task of examining the significance of the various technologies for Germany at the start of the 21st century. The initial emphasis will be on identifying technology policy priorities. These include developing new materials, the production and technology management methods of the future, biological and genetic engineering methods, and microsystems engineering and microelectronics processes.

In view of the great importance of small and medium-sized firms for Germany's technological competitiveness, SME [small and medium-sized enterprise] support will be further increased and restructured: Support will amount to nearly 600 million German marks [DM] a year, and the support structure will be greatly simplified.

The BMFT will give special weight to the European aspect. In the period preceding Germany's EC Council presidency in the second half of 1994, the BMFT will take initiatives designed to increase the competitiveness of European industry in specific areas.

Great importance will be given to shaping the future for the common good. Priority will be given to ecological research and environmental engineering. A new environmental research plan with new emphases will therefore be presented before the end of the year. The "Health Research Program 2000" will set a new course in health research. It will concentrate on such diseases as cancer, AIDS and other infectious diseases, and cardiovascular diseases.

Even if the energy supply is secure, innovation strategies are still required in two directions: energy-efficient management and the development of environment-friendly energies. In transport, environmental problems and measures to maintain mobility are becoming increasingly urgent. The BMFT will therefore be backing a large number of technological approaches in future under the general heading of "Optimizing Transport Chains" and "Ensuring Environment- Compatible Mobility."

The Federal Research Ministry intends to take an active part in shaping the future. It would like to promote technologies that will be indispensable to Germany in 10 or more years' time and make a contribution to a humane and ecologically aware world. This also means shelving some topics. Decisions will have to be made against a lot of projects, and in others the decision-making process will have to be speeded up. The Federal Research Minister takes due account of this in his claims on the 1994 federal budget, for medium-term financial planning and for particular project plans.

No funding will be made available for major new basic research facilities in the next few years. The BMFT will now give priority to funding targeted over knowledge-oriented basic research.

The manpower restructuring process at the major research institutes will continue. About 1,900 jobs will be cut by 1995.

Germany will not be undertaking any more major space research projects on its own. Adapting the development and operating strategies for the Freedom space station should improve the cost-benefit ratio of the European contribution and reduce costs for its subsequent operation. There will be no fifth space program.

In energy research, support for fossil fuel, coal, and power station technology research will be cut back.

The BMFT's involvement with analog HDTV [high-definition television] will end with the completion of the EUFEKA [European Research Coordination Agency] "High Definition Television" project. The BMFT will concentrate its future support on the prospects for digital HDTV. The BMFT regards the market launch of HDTV,

currently being discussed at EC level, as a matter for industry and, as such, one that ought not, in principle, to be subsidized by the state. The Federal Research Minister also believes that the D2-MAC "intermediate technology stage" is unnecessary for the market launch of HDTV.

Italy Adopts EC Legislation on Genetic Engineering

M12806100093 Milan ASSOBIOTEC LETTERA in Italian May 93 pp 1-2

[Text] With the passing of Legislative Decrees No.'s 91 and 92, published in the ordinary supplement to the government GAZETTE No. 78 of 3 April 1993, the EC directives No.'s 90/219 and 90/220, regarding the confined employment of Genetically Modified Microorganisms, (GMMO's) and the deliberate release of Genetically Modified Organisms (GMO's), have become applicable in Italy. As far as the application of these decrees is concerned, it has been announced that the Ministry of Health will be the main authority, working in collaboration with the other departments involved. On the whole, these two legislative decrees appear to have been designed to meet the need of those working in this sector, not only in industry but also in universities and research centers, and to make them subject to the same kind of regulations governing genetic engineering as those currently in force in most of the other European countries.

Restrictions on the Use of Genetically Modified Microorganisms

The decree makes provision for various classifications when giving notification of equipment and operations. Depending on the estimated level of risk posed by the GMMO's employed, these are classified in two groups:

- Group I, which includes those microorganisms that pose no risk;
- Group II, which includes microorganisms posing possible risks. Depending on the scale and the type of use, operations are divided into:

—Type A, for use on a small scale, for research and development, and for teaching purposes.

—Type B, for use on a large scale, and/or for industrial or commercial purposes.

Notification has to be given to the Ministry of Health of all plants and laboratories in which GMMO's are used, within 60 days of the coming into force of the decree. Within the same time limit, separate and detailed notification must also be given of all Type B operations (that is, large-scale or industrial operations) employing GMMO's falling under Group I, while notification must be given of all operations, whether Type A or Type B, which employ GMMO's falling under Group II.

After the expiration of the 60 day time-limit specified, any organization that intends to make confined use of GMMO's for the first time is obliged to proceed as

follows: If Type A operations using Group I-type GMMO's are being performed, a statement detailing these activities must be prepared and held available for inspection by the authorities, in the case of Type B operations, notification has to be given. Notification must be given of all operations that involve the use of Group II-type GMMO's, and in addition, operations of this type may not be initiated until explicit authorization has been received from the authorities. Notifications should include:

- Administrative and logistical details;
- Details of the microbiological system;
- Details of the installation and its purpose;
- An evaluation of the risks posed to man and to the environment.

Deliberate Release of GMO's into the Environment (plants, animals, microorganisms, fungi)

The decree makes provision for various procedures, depending on the type of use made of genetically modified organisms:

- Experimental releases and field tests for research purposes;
- Release onto the market of products containing, or comprising, GMO's.

In all cases, notification must be given to the authorities of the intention to proceed with the release of GMO's into the environment. This notification must be accompanied by an evaluation of the estimated risks posed to the environment. No releases may be effected until approval has been received from the Ministry of Health. If this approval has not been received within 60 days of the notification being given, then permission should be considered as having been denied.

For commercial releases, it will be necessary to follow the authorization procedure laid down by the EC.

The following information must be given in notifications of experimental releases:

- Administrative and logistical details
- Information regarding the GMO's
- Information regarding the release and its purpose
- Interaction with the environment and security measures.

In addition, notifications of commercial releases must also include the following:

- An evaluation of the risks posed to man and to the environment
- Information on marketing and use.

The two decrees prescribe that notification must be given of all laboratories, and certain operations, that make use of Genetically Modified (Micro) Organisms to:

- The Ministry of Health, Department of Public Hygiene,
- Division V - Biotechnology Notification Unit, 60 Via della Sierra Nevada - Rome 00144 Tel. 06-59944209 Fax 06-59944249

In collaboration with the Higher Institute of Health, forms have been prepared containing detailed instructions on how to set out the notification for the confined use of GMMO's.

Forms for the notification of the deliberate release of GMO's, are annexed to the relative legislative decree.

It should be pointed out as a matter of urgency that all users currently making confined use of of GMMO's—whether in research operations or to productive ends—are obliged to give notification of these operation no later than 18 June 1993, failing which they will become liable for severe penalties.

Further detailed information and forms containing the lines to be followed when setting out the notifications are available at the association's [Biotechnology Association] offices.

France: Fillon Addresses Interparliamentary EUREKA Conference

BR2206114393 Paris RECHERCHE TECHNOLOGIE in French May 93 pp 4-15

[Unattributed article based on Research Minister Fillon's speech to the 6 May conference of members of parliament of EUREKA member countries: "Fourth Interparliamentary EUREKA Conference"]

[Text] Members of parliament from EUREKA member states meet every year for a joint work session and exchange of views on activities to date and the future direction of the program. On 6 May, Francois Fillon chaired this fourth Interparliamentary Conference, which brought together 100 participants.

"A little more time is needed before an assessment of the technological and financial repercussions of EUREKA can be made because many projects have not yet reached their industrial or commercial stages. However, the initial results look globally satisfactory in terms of the objectives set out in the Hannover Charter. In terms of processes and products, 40 percent of the participants produced actual results and this trend should accelerate," said Francois Fillon in his speech to the EUREKA Interparliamentary Conference.

The minister stressed that, although the infrastructure of the initiative had proven to be particularly effective, there was a need to focus on some improvements which

Norway could examine when it takes over the program presidency on 24 June next. These include:

- Increasing the homogeneity of the project evaluation criteria, improving the transparency and synchronization of national subsidies, and strengthening the links between EUREKA projects and EC programs;
- Providing more systematic aid to small- and medium-sized enterprises in seeking partners and during the development of the project, especially through general supportive measures.

The minister also recalled that, under the French presidency, two approaches had been examined in depth. The first concerned exchanges of information which could be achieved by setting up an informal network between those responsible for EC programs and EUREKA. The second concerned focusing on about 20 EUREKA projects which were considered priority and likely to lead to interaction between the two initiatives which could in turn lead to EUREKA projects being funded by the EC.

During this one-day conference, several projects of particular importance were presented: Citrus (automation of fruitpicking), Rosal (rose growing), DRIVE (research and development in data communications for road transport), Promothus (road traffic security improvements), and Fedotozine (clinical development of fedotzine in gastro-enterology).

Swiss National Program for Computer Technology

93WS0520A Geneva JOURNAL DE GENEVE in French 5/6 Jun 93 p 20

[Article by Turhan Boysan: "The Computer Industry Plays Catchup"; first paragraph is JOURNAL DE GENEVE introduction]

[Text] Our country lags behind in computer research. Thirty-three projects have just gotten underway, 13 of them in French-speaking Switzerland.

"Technological industries such as computer science face a severe shortage of qualified specialists in Switzerland," points out Roland Crottaz, president of the Council of Federal Polytechnical Schools (EPF), and Andre Aeschlimann, president of the National Fund Research Council. Noting the steadily increasing sums Swiss industry spends on research and development abroad, the Federal Council has launched six priority programs lasting through the end of the century. One of them is specifically concerned with computer science.

Like the environment and biotechnology programs, the computer research program will be managed by the National Fund. The plan for implementing it was submitted to the Federal Department of the Interior, and Parliament initially passed a funding package of 66 million Swiss francs [SFr]. That amount was halved in the end, leaving a total package of only SFr33 million,

including a basic appropriation of SFr9 million to the Advanced Schools to fund researcher positions and SFr24 million to develop projects.

Research Lag

"Switzerland is among the countries that have the highest density of computers and that systematically implement new computer technologies," stresses Jean-Michel Grossenbacher, director of the program. "On the other hand, we lag behind in information technology research itself. Compared to what they invest in other industries, companies are not making much of an effort: In most cases, they settle for developing, adapting, or maintaining standard products."

Consequently, research, which is centered mainly in the Advanced Schools, has never grown beyond a fairly modest level. Funding of SFr177 million was nonetheless granted between 1986 and 1991, thanks to special measures adopted by the Swiss University Conference's Computer Science Commission. The money paid for the university's computer communications network "Switch," a high-performance processor installed at the Manno Swiss Center for Science Computing, and training.

The Confederation plans to use this priority program to insure the development of new information technologies through focused research; it will support three main lines of study, which it selected after consultation with industry circles and a group of foreign experts. The first deals with the design of "safe and complex" systems: It will analyze the causes of financially-costly computer breakdowns, as well as communications security (coding, access protection), user needs, and the integration of diverse systems.

The second line of research involves knowledge-based systems. The five-part program will study the latest developments in artificial intelligence and computer-assisted "decisionmaking management," including logic applications, modeling, visual recognition, and written and oral language processing. Massively parallel systems are the last area for study. Given technological limits and the need for huge amounts of computing power, the goal is to develop software that uses the full capacity of already available hardware and to design specific architectures and new computing principles (multiple processors, artificial neural networks).

Diversity in French-Speaking Switzerland

The National Fund has received 157 project outlines, with the second module sparking the most interest (74 requests). It has selected 39 requests, organized into "expertise circles." By combining several related topics to achieve a certain critical mass, 33 projects have finally gotten underway for an initial sum of SFr10 million. French-speaking Switzerland did rather well: It is home to 13 projects (six at the EPFL, four in Geneva, two in Neuchâtel, and one at Fribourg). It also received SFr4.13 million in basic appropriations to train its researchers.

The topics of the projects, which in many cases are co-managed by several research centers, also highlight the diversity of French Swiss interests. Examples include failure-proof communications architecture, electronic mail management, inventory procedures for "interactive and uncertain" environments, 3D visual recognition systems, and others. Moreover, a center for expertise in neural applications and machines is being created in Lausanne. It will bring together the EPFL's microcomputing and power system laboratories, its circuits and systems chair, and the Swiss Meteorology Institute.

EUCLID Military Components Projects Approved

BR2406142593 Paris *ELECTRONIQUE*
INTERNATIONAL HEBDO in French 10 Jun 93
pp 21-22

[Unattributed article: "Europe's First Steps in Military Components Sector"]

[Text] Two of the 11 electronics research topics of Europe's military EUREKA program focus on components. France is actively involved.

European cooperation in military systems is relatively frequent at the industrial level, but rare in the area of research. This is why the European EUCLID [European Collaboration for the Long Term in Defense] program was launched in 1989. It is sometimes called the military version of EUREKA, since every EUCLID contract requires the cooperation of laboratories or companies in at least two countries. Unlike EUREKA, however, research topics are proposed by the Ministries of Defense rather than by industry. Within EUCLID, one working group is responsible for microelectronics. Two of the 16 contracts waiting for the green light have already been approved, with France participating in both. Another two or three contracts are to be approved later this year. For the moment, these research projects will have a very marginal impact as regards anticipated technical findings, but they will enable foreign laboratories to start working together. This is one of the main objectives of the Ministries of Defense, which are concerned by the fact that semiconductors for military purposes represent only 2 percent of the world market in volume and 5 percent in value.

The first project, approved in September 1992, deals with interconnection technology. Matra Defense was chosen as prime contractor, with Matra-Marconi Space, BGT [Bodensee Equipment Technologies], GEC [General Electric Company]-Avionic, and Alcatel Bell as subcontractors.

Defining a Range of Programmable Circuits by the End of 1994

The initial phase of the project involves comparing technologies with needs and applications. The first phase should specify the directions of development to be taken, while distinguishing specific from general needs and

tracking synergies between the civilian and military sectors. This phase should be concluded by the end of 1993.

The second contract, approved in December 1992, relates to programmable circuits. The contractor chosen was CETIA [European Computer-Aided Engineering Techniques], together with the Portuguese partners EID [Electronics Research and Development Company] and

IST (Higher Technical Institute). The objective is ambitious: to study the feasibility of developing a range of programmable products combining all the qualities found in products currently on the market.

It would then be a matter of defining such a circuit range by the end of 1994, and doing so using technology available at that time. It is hoped that a silicon prototype will be available by that date.

Sixteen Military Microelectronics Contracts Under Study

| Programs | Signature, technical arrangements | Participating countries | Consultation | Approval | Remarks |
|-----------------------------|-----------------------------------|------------------------------------|--------------|----------|-------------------------------------|
| SOI ³ technology | — | Fr ¹ , UK* ² | — | — | Suspended |
| Interconnection, assembly | 31-1-92 | Bel-Fr*-Ger-UK | 3-2-92 | Yes | — |
| Qualification | 13-4-92 | Fr-Ger*-It-UK | 30-11-92 | — | — |
| Behavioral model | — | Fr-UK-Por | — | — | Proposed for Commission II approval |
| SOI cell library | 2d qtr 93 | Fr-Neth-UK* | 2d qtr 93 | — | — |
| ASIC | — | — | — | — | — |
| Mixed analog-digital design | 2d half 93 | Be-Fr-Por-UK* | 3d qtr 93 | — | — |
| High-speed A/D converter | 1st qtr 93 | Fr*-UK | 2d qtr 93 | — | — |
| Programmable IC's | 3-7-91 | Fr*-Po | 23-10-91 | yes | — |
| Error-free ASIC's | — | — | — | — | canceled |
| CAD tools | — | — | — | — | canceled |
| MMIC CAD tools | — | Fr-UK | — | — | under discussion |
| MMIC interconnection | 3d qtr 93 | Fr*-Neth-UK-Tu | 3d qtr 93 | — | — |
| MCM qualification | — | — | — | — | under discussion |
| High-temp. electronics | — | — | — | — | under discussion |
| Nuclear resistance | — | — | — | — | under discussion |

(Source: DGA)

Footnote 1. Country abbreviations: Fr = France; Be = Belgium; Ger = Germany; It = Italy; Po = Poland; Neth = Netherlands; Tu = Turkey

Footnote 2. Country with asterisk (*) is project leader

Footnote 3. Technology abbreviations: SOI = silicon-on-insulator; ASIC = application-specific integrated circuit; D/A = digital-to-analog; IC = integrated circuit; CAD = computer-aided design; MMIC = microwave monolithic integrated circuit; MCM = multichip module

Ministers Unanimous on Admitting Russia to EUREKA

PM2906132893 Paris LE MONDE in French 26 Jun 93 p18

[Report by Annie Kahn: "Russia To Join the Eureka Program"]

[Text] Meeting in Paris on 23 and 24 June for the 11th EUREKA ministerial conference, the research ministers of the 20 European countries which are members of this program decided unanimously to admit Russia (The 20 EUREKA member countries are the 12 Community countries, the six EFTA countries, Turkey, and Hungary. The Brussels [EC] Commission is also a EUREKA

member). Russia's admission remains subject to the settling of certain "technical" problems, but should become effective in the next few months. Russia is the second eastern country to join EUREKA, after Hungary, which was admitted last year.

Not long ago, exporting technologies to the USSR was a complex action subject to the nit-picking rules of COCOM (Coordination Committee for Multilateral Control of Exports). Russia's admission as a member of the Eureka research program is therefore not without irony. Especially since the program was conceived, nearly eight years ago, as a civil and European response to the U.S. SDI, better known as "Star Wars." Admittedly Russia's "effective" admission is still subject to the

"settling of technical problems," as was explained by Francois Fillon, [French] minister of education and research, at the press conference at the end of the 11th EUREKA ministerial conference. Compatibility with COCOM rules forms part of this. But Mr. Fillon expects these problems to be resolved quickly, and Russia will become a full member a few months from now.

This 21st member country should render even more fruitful this program which has already set its seal on 816 research projects representing a financial package of 107 billion French francs [Fr]. Some 4,000 participants have benefited. At the end of this year of French presidency, 193 new projects have been approved. Two-thirds of them are related to the six spheres defined as strategic: agriculture and food, automotive industry, diagnostics, information science, waste treatment, and the factory of the future.

Undeniable Spinoff

An industrial and economic evaluation carried out on France's initiative confirms the effectiveness of this system for applied research, especially when it is applied to projects on a modest scale. The success of mammoth programs like Jessi in electronics, TVHD for high-definition television, and Prometheus for the automotive industry is in fact more debatable. This is not a negligible drawback: The three of them account for budgets of nearly Fr38 billion, or more than a third of the sum available.

The evaluation, carried out by a group of international experts, did not study these heavyweight projects in depth. As for the others, it demonstrated their beneficial economic impact. Some 82 percent of participants believe that they are relevant to marketable products or procedures. According to a specific study of 119 French projects (which therefore excludes the very big programs), turnover of around Fr33 billion is expected, for a total cost of Fr9.2 billion. True, these figures do not give much indication of the financial profitability of the investments agreed on. But the indirect spinoff appears undeniable: improving the technical level of the participants, contributing to personnel training, and improving their capacity to conduct projects on a partnership basis. The EUREKA programs effectively bring together research teams from public or private laboratories of different nationalities (at least two countries must be represented) on topics of their choice.

Another plus: For 18 percent of respondents to the general evaluation questionnaire, participation in EUREKA has led to the recruitment of additional employees. About 20 French enterprises questioned estimate at 700 the number of jobs created for conducting the research project or ensuring the production and marketing of the products created.

EUREKA seems particularly well suited to small and medium-sized industries. Of the 1993 crop, 40 percent of the projects have small and medium-sized industries at

their head: "This trend had not been expected, in difficult circumstances," a delighted Henri Guillaume, chairman of the EUREKA high-level group, declares. The acceleration of financing agreements in all the member countries (modeled on what has been happening in France for the last three years) should further increase the involvement of small enterprises. The system's weak point is that the coordination of EUREKA projects and Community research programs is inadequate. Only 3 percent of EUREKA projects follow on from Community programs. An information and coordination network between the managers of the two systems has been set up with a view to rectifying this.

After France, Norway takes on the EUREKA presidency for the next 12 months. It will put the emphasis on the environment: "All new projects should show that they are taking environmental aspects into account," Finn Kristensen, Norwegian minister of industry and energy, explained; he will also favor the involvement of small and medium-sized industries and of eastern European industries.

Goals, Budget of EC 'Biotechnology 1994' Program Outlined

BR2705093093 Zellik *BELGIAN BUSINESS ET INDUSTRIE* in French Jun 93 p 108

[Unattributed article: "European Program"]

[Text] The European Commission has just launched a call for proposals within the scope of the "Biotechnology 1994" R&D program. Endowed with a budget of ECU10 million, to which may be added an additional but as yet undefined sum, this call for proposals covers a wide range of research topics, including protein structures and genetic regulation in microorganisms (mainly the *Bacillus subtilis* yeast), the conservation of genetic resources, and the application of transgenesis to animals in order to better understand human pathologies such as cancer, arterial hypertension, and AIDS. To qualify for financial support, the projects proposals, which can be submitted by industrial research institutions, must involve at least two partners established in two different member states.

The projects will be cofinanced, with the EC providing up to 50 percent of the total research cost. The closing date for submissions is currently fixed as 1 July, but it is quite likely to be extended to 31 August.

CORPORATE ALLIANCES

German Aerospace, Fokker Sign Takeover Contract

M10206091393 Bonn *DIE WELT* in German 28 Apr 93 p 12

[Text] German Aerospace (DASA) and the Netherlands Fokker Aircraft Works evidently have definite information that Japanese firms are interested in building

medium-haul aircraft. DASA Board Chairman Juergen E. Schrempp stated at the signing of the contract whereby DASA purchased a 51-percent majority in Fokker yesterday that it was now necessary "to secure Europe's position on the world market for medium-haul jets."

Describing the signing of the contract as a "historic event in the history of European aircraft manufacturing," the affable DASA chief went on the stress that DASA had "achieved an economic and strategic objective with its purchase of Fokker. Now the way is open for us to put our full weight into the promising regional aircraft market in genuine European cooperation."

Nor did Schrempp sidestep the emotionally charged subject of cultural differences between the Netherlands and Germany. "This marriage of two firms is a challenge. We, DASA and Fokker, will be the first Netherlands-German collaboration to work successfully," Schrempp promised. But neither Schrempp nor Fokker Board Chairman Erik Jan Nederkoorn were able to give a straight answer as to whether and when a new regional airliner will now be built, or whether there will soon be a modernized and lengthened version of the Fokker 100.

Siemens Enters Joint Communications Venture In Thailand

MI0106144393 Berlin NTZ in German No 4, Apr 93 pp 318-319

[Text] Siemens AG's Private Communications Systems (PN) Division has announced the formation of a joint venture to sell and service its Hicom private branch exchanges in Thailand. T.N. Inc. Ltd., Thailand's market leader for private communications systems, holds 51 percent of the joint venture and Siemens 49 percent. The new company, Bangkok-based T.N. Communication Systems Ltd., has about 100 employees and in its first few years will sell, on average, 30,000 Siemens telephone system line units. It is looking to gain at least 25 percent of the Thai market. Siemens' PN Division is currently stepping up its expansion in southeast Asia, including China. A joint venture to manufacture, sell, and service Siemens telephone equipment was founded in Shanghai only recently. Sales and service centers have already been established in ASEAN [Association of South East Asian Nations] countries such as Malaysia, Indonesia, Singapore, the Philippines, and Brunei. This business is coordinated by Siemens' Singapore branch, which opened a private communication systems specialization center for that very purpose in January 1993. The market for communications products in southeast Asia is growing by more than 10 percent a year, significantly above the 3 to 4 percent world average.

Philips Withdraws From Joint Venture With Matsushita

MI0806125293 Bonn DIE WELT in German 3 May 93 p 16

[Text] Completely unexpectedly, Philips Electronics NV has now withdrawn from a major strategic and technical

joint venture with its Japanese competitor, Matsushita. Philips reports that it will receive 3 billion Dutch guilders for the sale of its 35-percent minority holding in MEC (Matsushita Electronics Corporation). The Netherlands electronics firm, deeply in debt, can well do with this cash injection, for, according to analysts' conservative assessments, at the end of the day the transaction could mean a book profit of between 500 million guilders and 1 billion guilders for Philips in the current financial year. In all, the financially shaky Eindhoven group can increase its, currently very flimsy, equity cover from only 9 billion guilders (1992) to 12 billion guilders with the incoming billions.

However, it is probable that Philips will use much of it for debt redemption. In 1992, incredible as it may seem, Philips had to pay 1.7 billion guilders in interest on its mountain of debt, which had risen to around 12.7 billion guilders, and also cope with a loss of 900 million guilders. In the next five years alone, short- and medium-term commitments of the order of around 11 billion guilders will fall due. They can only be paid if profits revive, but the recession makes this hardly likely, at least in 1993.

The withdrawal prompts many questions, which Philips will not answer until the forthcoming quarterly press conference on 5 May. The timing is surprising. The brief press release was issued on Friday, the Dutch national holiday, and was completely unexpected. As the Amsterdam stock market was shut, brokers in London, Frankfurt, and New York profited from the Philips rally that it provoked, as a result of which Philips stocks rose by an average of over 2 guilders to more than 27 guilders each.

Many analysts were agreed that this windfall comes at just the right moment for Philips, and considerably expands the company's financial range of action, which had become extremely narrow.

In strategic respects, however, "Philips' sale of the family silver," as it is called in Holland, raises many questions, for, as MEC produces chips, picture tubes, and lighting products, it is involved in precisely those areas that are key concerns of Philips Electronics NV. Geographically, Matsushita Electronics Corp. is also active in the United States and Singapore, as well as Japan. Does Philips' withdrawal mean that it is partially backing out of the Asian market? Is it the beginning of the end for the collaboration, which has so far been creative in many areas, despite the competitive position, between Philips and the Japanese electronics giant? Philips denies this, pointing to the fact that the digital music cassette, DCC, and the interactive CD, CDI, were developed jointly with Matsushita.

Philips, Hoechst To Create Magneto-Optic Disk Venture

BR1606085293 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 3 Jun 93 p 12

[Article signed F.L.: "Data Storage: European Companies Join Forces in Magneto-Optic Disks"]

[Text] Philips and Hoechst are planning to set up a joint venture uniting their respective activities in the field of plastic magneto-optic disks before 1994.

There soon will be only one European entity in the field of plastic magneto-optic disks. The Netherlands company Philips and the German company Hoechst have just announced their plans to pool their respective activities in the sector in a joint venture to be created before 1994. It should be recalled that the magneto-optic storage media planned for industrial production by the Toulouse company ATG [Alcatel Thomson Gigadisk] use glass substrates and are more expensive than plastic disks. The new company, which according to Hoechst will be shared two-thirds by Philips and one-third by Hoechst, will pool Hoechst's Wiesbaden plant (with a production capacity of 1 million polycarbonate-substrate magneto-optic disks per year), with a part of Philips' optical media activities in Eindhoven.

Objective: Conquer 15 Percent of the World Market Before 2000

In the Netherlands, Philips employs approximately 200 people in the field of professional optical media, of which 110 in plastic-substrate magneto-optics and the remainder in glass magneto-optics and read-only WORM [write once read many] disks. Of this staff of 110, 23 will be laid off, the remaining 87 employees will join the new company. Philips, which is among the world leaders in optical disks (with an audio CD production center in Louviers, Normandy, another in Blackburn in the UK, etc.), is giving no details on its magneto-optic media production or on the objectives of the joint venture. Hoechst is expecting its revenues in the field of plastic magneto-optic media to be in the region of 40 million French francs [Fr] this year. Hoechst produces 3.5-inch disks (128 Mb) and 5.25-inch disks (650 Mb and 1.3 Gb since last month) and estimates its world market share at 10 percent.

According to the German chemical company, the world market for plastic magneto-optic media will reach Fr3.4 billion in 1996 and the joint venture should capture approximately 15 percent of the market before the end of the decade. This is expected to be due partly to the development of new polymer materials (COC), "whose transparency equals that of glass," for which Hoechst concluded a joint research and development agreement last April with the Japanese company Mitsui Sekka.

CORPORATE STRATEGIES

Germany: Alcatel SEL Places Strategic Development in Foreground

93WS0429A Frankfurt/Main *FRANKFURTER ZEITUNG: BLICK DURCH DIE WIRTSCHAFT* in German 2 Apr 93 p 8

[Article by correspondent K.T., Munich]

[Text] Electronic technology invades all areas once dominated by mechanical technology. Obvious examples are washing machines and typewriters, cars, and various branches of telecommunication. This applies especially to telephone exchanges, where mechanical rotary lever dials or motor-driven precious-metal dials are being replaced by digital electronic switchboards.

This trend is a painful one for equipment makers, inasmuch as it calls for radical changes in the manufacturing process. Entire factories need to be re-tooled. The production system for a mechanical-analog telephone exchange was structured so that as to consist of 40 percent manufacturing equipment, 43 percent labor teams, and 17 percent plant auxiliaries.

Modern electronic exchanges such as, for instance, type Alcatel 1000 S12 lower the labor productivity by not less than 70 percent, essentially because they involve assembly of mostly imported microelectronic components. In personnel terms this means a reduction of the labor force which until now handled mechanical components, including many trained women, and on the other hand hiring of software engineers who will take over the much expanded measurement of test procedures.

The number of added employees is, however, smaller than the number of those not needed for the now obsolete jobs. It thus comes about that at the Alcatel SEL in Stuttgart, which may be regarded as a typical division of the company, the sales figures are nevertheless improving, because the new products are better and therefore are priced higher than the old ones.

Such a reconstruction of the manufacturing process is extremely expensive. There are enough examples of enterprises where, owing to a shortage of money, conversion from mechanics to electronics had begun too late. Their position on the market was each time severely damaged. Recently Doctor Professor Gerhard Zeidler, chairman of the Alcatel SEL board of directors, indicated how his company had been able to solve this problem. Telephone exchange engineering has been appropriately challenged not only in this area but also in areas such as office and railroad intercommunication.

Since the year 1929, the SEL following its predecessors belonged first to the American ITT, until it was transferred to French ownership in 1989. Today its majority stockholder is the Alcatel-Alsthom Group. There, thinking emphasizes strategy, as G. Zeidler explains, while the ITT was rather result-oriented.

Since then the SEL is able to maintain the annual profit level in its operations, while also significantly replenishing the somewhat neglected pension fund so as to make up for setbacks and reverses it had suffered. In both 1990 and 1991 the contributions amounted to DM308 million on the forward balance. These contributions also benefited new investments in the new states which had joined the Federal Republic, as for instance relocation of the railroad equipment factory with its 600 employees from Berlin to Armstadt in Thuringia.

This became necessary when the two principal customers Deutsche Reichsbahn and Deutsche Bundespost Telekom demanded, just as they did of the telecommunication industry, that substantial portions of their orders be filled in those new states.

Germany: Future of Mobile Communications Industry Discussed

93WS0430B Duesseldorf VDI NACHRICHTEN
in German 9 Apr 93 p 9

[Article by "RB/RUS" under the rubric "Topic: CeBIT [World Office and Information Technology Center (at the Hannover Fair)]: "CeBIT Forum: Sales Boom in Cellular Telephones. Always Mobile and Ready to Transmit. Telekom and Mannesmann Want to Have Expanded Their Network to Almost Blanket Coverage by the End of the Year"; first paragraph is an introduction]

[Text] Hannover, 9 Apr 93 (VDI-N)—Cellular telephones are becoming smaller, lighter and, just as the call charges, lower priced. These development trends were agreed on by the participants in the "Trends in Mobile Radio" discussion group to which VDI NACHRICHTEN had invited at the CeBIT fair representatives of both D-network [digital radiotelephone network] operators and a telephone manufacturer, as well as a communications scientist.

Three manufacturers tussled equally in Hannover at the CeBIT Fair (21 to 28 March) over the sales-promoting predicate of offering the smallest cellular telephone at present. "They will surely not become much smaller," said Harald Stober, chief executive of Mannesmann-Mobilfunk [Mannesmann Mobile Radio] in commenting on the trend. "The tiny things need room for batteries, and the connector for an adapter, and the operating buttons have to be of a minimum size."

But something will change already by the year 2000. Cellular telephoning can become even less expensive. Stober: "When the first manufacturer offers its set on the market at a selling price of 800 German marks [DM], then call charges in our D2 network will also be less than DM1 per minute." Now DM1.21 per minute plus value-added tax [VAT] has to be paid in the D2 network, and competitor Telekom bills at DM1.20 per minute plus VAT in the D1 network.

The telephone manufacturers want to hear nothing of dropping set prices at the moment. Harald Stumer, mobile communications marketing manager at Panasonic, acting in behalf of the entire industry, sympathized during the discussion, saying, "The selling prices for the small sets are already below our purchase costs for the components." Consumers should also not just be happy about inexpensive sets, according to Stumer, for then manufacturers will simply lack the money for developing the next generations of sets.

"I'm getting tears in my eyes," the Mannesmann manager countered, and he calculated, "More and more GSM [Groupe Special Mobile (CEPT [European Conference of Postal and Telecommunications Administrations] study group for digital cellular telephone)] networks that correspond to our D-network technology are going into service in Europe, Asia and worldwide. Whoever wants to keep up here needs a production capacity for around one million cellular telephones a year. Production costs will drop by themselves then with these numbers."

However, all those involved in the D networks were out in their estimation together. To begin with they are banking on sales of large car telephones. But customers more and more often want cigarette-pack-size models. "I am proceeding on the assumption," estimated Harald Kerler, public mobile radio division head of Telekom, "that the small hand-helds will reach a market share of 70 to 80 percent this year."

In the opinion of the operators, it is up to the industry to satisfy this demand. Kerler and Stober stated with regret that the small telephones of almost every manufacturer could be delivered not until the fall. This is not the manufacturers' fault, is Panasonic manager Stumer's comment to that. "Both operators have month after month introduced additional features like call diversion, for example." And, "A set has to function the moment it is delivered." Both manufacturers and operators agree that they had to suffer during the constant adjustments of the GSM standard.

It is an open question whether the new mobile telephoners will use Telekom's D1 network or Mannesmann Mobilfunk's D2 network. Harald Stober is optimistic about D2: "The 200,000 subscribers at present speak for us." Hans Kerler of D1 counters, "To our 126,000 D1 subscribers will be added 106,000 more in the C [450-MHz cellular telephone] network, whom we gained in just the last year, because the D network still does not provide blanket coverage."

Both D networks are to be expanded rapidly. At present both D1 and D2 cover around two-thirds of the area of Germany and reach around 75 percent of the population. The expansion is to cover 83 percent of the area at the end of 1993. Ninety percent of the population will then be able to subscribe to these services. Hans Kerler: "With the expansion we will be almost at the precisely equal point."

The debate about electromagnetic compatibility (EMC) for the time being is not having much influence on the expansion. "We are operating around 1400 base stations for the D1 and C network," Hans Kerler commented. "Thus far there have been only 48 cases of problems, and 16 were in a single city."

However, this debate annoys the suppliers, because thus far there has been no proof of danger from cellular telephones. The Radio Communication Research Group, a study group founded by operators and manufacturers, has already awarded research contracts, they said in the discussion group. The first results are expected towards the end of the year.

Harald Stober commented on the order of magnitude of the transmission power in this connection: "The small hand-helds have a transmission power of 0.8 to 2 watts. All the sets together do not once reach the transmission power of a single television transmitter. Measurements are in megawatts in that case."

The customers may feel insecure, but the rush to buy continues. Communications scientist Klaus Lange gave an explanation for this: "The technology of the sets is just as fascinating as the ability to be reachable at any time or to call anyone." He acknowledged that man's communication behavior is changing because of this, but he does not believe in annoyance from constantly chirping telephones: "The user will be in total command to decide himself when he wants to be reachable."

The Radio Communication Research Group Explains

In assessing electromagnetic waves and the minimum distance, resulting from this, between the antenna of a mobile telephone and one's head, according to the portrayal given by the Radio Communication Research Group Registered Association (FGF in Bonn), one must distinguish between cordless telephone transceivers, also called "handies" or "hand-helds," and portable mobile telephones, "portables." According to FGF, the handies for the D1 and D2 mobile telephone network operate with a maximum transmission power of 2 watts. The Federal Agency for Radiation Protection (BfS) also considers such a transmission power safe and accordingly gives no recommendation for a minimum distance between the set's antenna and one's head. For models having a power of 4 watts, it is a question for the most part of larger portable sets that consist of a handset and a separate transmitter. For these sets, according to the Radiation Protection Commission's recommendation, a minimum distance of 2 cm to 20 cm should be observed depending on the transmission power. These distances have also been stipulated in VDE 0848 [Association of German Electrotechnical Engineers recommendation]. Mobile telephones should not be confused with cordless telephones having a maximum range of 300 meters. They have a transmission power of 10 mW.

German Chemical Giants Perform Biotech Research Abroad

M10106145893 Bonn DIE WELT in German 16 Apr 93 p 14

[Article by Juergen H. Wintermann: "Billions in Research Money Take Off Abroad—German Chemical Industry Experimenting Mainly in the United States and Japan—Fewer German Inventions"]

[Text] The call by Federal Research Minister Matthias Wissmann (CDU [Christian Democratic Union]) for industry to invest more in research and development (R&D) has triggered differing responses. On Easter Monday, Wissmann, referring to the merely marginal increase in R&D expenditure, described a change in this trend as "urgently needed." Wissmann argued that "if we are to beat the recession, technology-intensive industries must be the driving force." German industry's research expenditure in the last three years has in fact risen only marginally, from 46.1 billion German marks [DM] to around DM50 billion per annum. Adjusted for inflation, this means at best stagnation. The reduction of scientific personnel in industry gives an even more depressing insight into the actual trend in R&D. Since 1989, the number of researchers, technicians, and ancillary staff has fallen by 2.9 percent annually.

Since back in the mid-eighties, the number of German patent applications has been fluctuating around the DM32,000. In 1965, there were 38,148. Even worse: Compared with the total number of inventions registered with the German and the European Patent Office in Munich, the German share of the brainwaves has fallen in the last decade from 47 percent (1980) to 29 percent (1990), the trend continuing downward. Gainers are the Americans (from 17 to 23 percent) and, above all, the Japanese (from 14 to 26 percent).

In the purchase of foreign patents and licenses, on the other hand, the trend is upwards. German industry is increasingly spending money to acquire innovations from foreign competitors, rather than developing its own. This applies more to medium-sized companies.

The situation is different in major industry, which prefers to use subsidiaries and associated companies, to emigrate with its billions in research money into parts of the world where scientists can work more freely, and transform their discoveries into lucrative products more quickly: principally the United States and Japan.

This trend is just as dramatic in genetic engineering. This key technology offers enormous future potential for health, nutrition, and environmental protection, but not in Germany, unfortunately. The long-awaited genetic engineering legislation is increasingly proving to be a block on innovation. Whereas a total of 858 genetic engineering experiments are currently taking place in the OECD [Organization for Economic Cooperation and Development] countries, just three experiments have finally been given the go-ahead in Germany following

extremely sluggish, costly licensing procedures lasting several years. Germany's chemical industry, which cannot afford to fall behind, is therefore consistently taking its genetic engineering work and its billions abroad. BASF is conducting genetic engineering research at its subsidiary in Boston, Massachusetts, and Schering is doing the same in Richmond, California. Hoechst is conducting experiments in Japan and producing in France. Bayer is researching in West Haven, Connecticut, and producing in Berkeley, California. A crosscheck confirms this: Not a single foreign company has so far invested a pfennig in genetic engineering in Germany.

The dismantling of Germany as a research location that goes hand in hand with this is already well under way. Apart from the costly pioneering role taken by Germany in environmental protection, the shortest working hours also play a part here. Whereas American and Japanese researchers are at their work benches for 2,300 to 2,500 hours per annum, their German counterparts only put in 1,600 hours. Output in those countries is correspondingly higher, and the time taken to transform discoveries into marketable products correspondingly shorter.

Not even the research minister in Bonn knows how many billions in research money our industry has now spent outside Germany's borders. No statistics are available. The only thing certain is that this trend is throttling growth in Germany and threatening our standard of living. Chemical Industry Labor Union leader Hermann Rappe is already warning: "Whoever opposes new technologies, also opposes work," by which he means not just genetic engineering, but also nuclear power.

To investigate the phenomenon of the migrant German research billions, Wissmann now intends to involve the Forecasting Institute. However, the paucity of innovation and know-how, employment and growth can only be changed by changing the framework conditions. This is a political task: Easter appeals from a minister serve relatively little purpose.

R&D Expenditure by German Chemical Giants in DM billions

| | 1990 Total | Percentage spent abroad | 1992 Total | Percentage spent abroad |
|---------|------------|-------------------------|------------|-------------------------|
| Bayer | 1,241 | 33.8 | 3,096 | 38.8 |
| Hoechst | 1,301 | 37.2 | 2,904 | 40.2 |
| BASF | 0.993 | 10 | 2,048 | 25.0 |

Germany: Microelectronics Industry Falls Increasingly Behind

MI0406120093 Bonn DIE WELT in German 22 Apr 93 p 14

[Text] The German microelectronics industry has probably fallen well behind the world leaders, said German Electrical Engineers' Association (VDE) Chairman Arno Treptow, assessing the association's survey of German

high-tech firms. Treptow attributed this to an inadequate policy framework and a low level of public acceptance for certain key technologies, resulting in both Germany and Europe producing fewer innovations in these areas than other industrialized countries.

The survey shows a further increase in German and western European dependence on non-European manufacturers, almost one in every two chips (46 percent) being imported from Japan; 38 percent of total world output is produced in the United States and only 11 percent in Western Europe. In contrast, Western Europe uses 18.5 percent of the world's chips.

The VDE's trend analysis forecasts that microelectronics consumption will rise from 5.2 billion German marks [DM] in 1991 to DM11.5 billion in the year 2000. The fact that automobile electronics accounts for a relatively proportion of sales (14 percent) is typical of the Federal Republic.

The world microelectronics market is expected to grow over the same period from \$54.6 billion to around \$140 billion, a high growth rate being anticipated in southeast Asia and low growth in the United States. In contrast, a decline to 32 percent in Japan's share of world consumption is forecast by the year 2000, as against the 1991 figure of about 38 percent. However, comparison per head of population shows Japan currently using 3.5 times more microelectronics in her products than Germany, and 6.5 times more than Western Europe.

The VDE anticipates good prospects for Germany as an automation, electrical engineering and electronics, and medical engineering manufacturing base.

Siemens Regards Transport Systems as Growth Sector

MI0406141193 Munich SUEDEUTSCHE ZEITUNG in German 23 Apr 93 p 33

[Text] Water, land, and air are all covered by new future- and growth-oriented transport systems developed by Siemens of Berlin and Munich. A 23-percent growth in revenue, to 7.1 billion German marks [DM], for the 1991/92 financial year to 30 September, already means that this relatively new sector accounts for 9 percent of Siemens' total business. The current financial year is expected to produce 15-percent growth, to DM8.2 billion, it emerged at the 1993 Hannover Fair. Only modern electronics offers a chance of averting the traffic gridlock that threatens the whole world.

As one of the major suppliers of complete systems, Siemens feels it has outstanding global prospects. They key to the future is automobile technology, in which Siemens' modest DM30-million sales of a decade ago have grown to the present DM3 billion, with "good prospects for profits too."

Electronics currently accounts for 18 percent of an automobile, though this could increase to 30 percent in

10 years' time. This development was launched in the United States by legislation limiting exhaust emissions. Electronic control systems have also helped to reduce fuel consumption by 25 percent, while electronics has brought the ABS [antiblock] braking system, the ASR [automatic slip controll] antiskid device, adjustable chassis, belt tighteners, and airbags into automobiles. Siemens managers expect airbags to be standard in all new cars by 1996. They also anticipate increases in revenue from electronic antitheft systems.

Parking management systems, already supplied by Siemens to 30 European cities, are claimed to reduce unnecessary traffic. Jams are likely to continue, however, until similar navigation aids have been installed on highways and ordinary roads, preferably incorporated into networks also involving taxis and local public transport.

The areas offering the greatest unexploited savings potential, however, are railroads and local public transport. Railroad technology is currently earning Siemens DM3.7 billion in sales revenue, and has shown 30 percent annual growth since its launch three years ago, the company being particularly strong in Europe, the United States, and southeast Asia. Siemens sees the Far East as its major future market. In contrast, it perceives the railroad map of Europe as still a patchwork quilt where growth is inhibited by differing track gauges, voltages, and safety systems, all requiring harmonization. Siemens intends to gain a disproportionately high share in the worldwide railroad market, which is currently growing by 7-8 percent annually.

Shipboard and harbor equipment is producing DM0.3 billion sales revenue, while aviation and airport technology are earning DM0.5 billion. In Europe alone, air congestion, "less visible than on highways", is costing between DM5 and 10 billion. To put it graphically, every holding loop by a jumbo wastes another tonne of fuel.

Germany: BASF Sets Up Acrylic Acid Factory in Antwerp

M10906135193 Eschborn NACHRICHTEN FUER
AUSSENHANDEL in German 27 Apr 93 p 28

[Text] BASF is to build a factory producing acrylic acid at its Antwerp site. According to BASF of Ludwigshafen, this major project, which involves a 350-million German mark [DM] investment, will comprise plants producing 160,000 tonnes a year of acrylic acid, which forms the basis for many high-grade products such as dispersions and superabsorbers for toilet articles and is also used in effluent treatment. The plants will go into operation gradually from July 1995.

BASF has hitherto been producing acrylic acid in Ludwigshafen and in Freeport, in the United States. The new factory, the opening of which will coincide with the closure of one of the three Ludwigshafen plants, will supply the growing market for aryl monomers on a

long-term basis. It will operate on propylene, which BASF Antwerp will be producing from the end of 1993 in a new steam cracker.

France: Military, Civilian Aircraft Industry Production Drops

BR2105143893 Paris ELECTRONIQUE
INTERNATIONAL HEBDO in French 6 May 93 p 14

[Unattributed article: "French Aircraft Industry Production Figures Down by 7 Percent in 1992"]

[Text] The French aircraft industry is not expecting any real pickup before 1995; Taiwan's Mirage aircraft order will have no impact on the industry before then.

Henri Martre, president of GIFAS [Organization of French Aircraft and Space Industries], sees no hope of recovery for the French aircraft industry before 1995. Results for 1992 show a slackening of business: Sales in the industry are down to 101.4 billion French francs [Fr], a 4-percent drop in constant francs as compared with 1991 (1.5 percent in current francs). Exports increased by 4 percent while sales in France slumped by 6 percent. In fact, the actual decline in activity is greater since production has dropped by 7 percent—a difference explained by the fact that the industry considerably reduced its stocks in 1992. The slump is being felt less strongly in the areas of aircraft and missiles (56 percent of the sector's sales volume) and equipment (23.3 percent of overall sales), whereas for engines (20.7 percent of overall sales), the drop is close to 20 percent. For 1993, a 7-percent drop in business for the whole sector is expected. The distribution between civilian and military activities remained stable in 1992 (respectively 53 and 47 percent of overall sales). However, exports of military equipment jumped by 24.4 percent, while those of civilian equipment were down 4.1 percent due to the difficulties in the airline industry.

Orders Up 21.6 Percent in 1992

Orders placed in 1992 jumped 21.6 percent to Fr112.1 billion, including Fr57 billion for exports. This is the result of the boom in orders for military equipment exports (up 211.3 percent) due to Taiwan's order of 60 Mirage aircraft and their missile complement.

As for employment, the decline in business that hit the French aerospace industry in 1992 led to a decrease in the number of jobs in the sector: Some 7,000 jobs were eliminated in 1992, bringing the total number of persons employed in the sector down to 111,600. This downward trend should continue in 1993 along the lines of this year's expected fall in business.

Even if companies that are union members implement partial work/unemployment schedules to limit lay-offs in 1993, the industry's labor force is expected to ultimately stabilize around 102,000 to 103,000 people.

France: Detailed Analysis of Aerospace Industry

BR0706114793 Paris LE BULLETIN DU GIFAS
in English 6 May 93 pp 1-8

[Unattributed report: "Provisional Estimates on the 1992 Performance of the French Aeronautical and Space Industry"]

[Text] M. Henri Martre, Chairman of GIFAS [Association of French Aeronautical and Space Industries], accompanied by MM. Jacques Mitterrand (OGA), Jacques Benichou, Jacques-Andre Larpent, Serge Dassault (Dassault Aviation), Jean-Paul Bechat (Messier Bugatti and Chairman of GIFAS Equipment Group), Charles Edelstenne (Dassault Aviation), Louis Gallois (Aerospatiale), Gerard Renon (SNECMA), Jean Sollier (SEP), Noel Forgeard (Matra Defense Espace), Philippe Lhotellier (Lhotellier-Montrichard) and Bernard Nicolas (General Delegate of GIFAS), held a press conference during which he reported French aerospace industry 1992 results and gave an outlook for 1993.

I) Market Environment

1) The World Economic Situation

In 1992, the world economic recession continued unabated. Economic growth in the major industrial countries was severely limited at a rate of only 1.5 percent in the OECD zone.

In Europe, the crisis is alarming: European unemployment (10 percent) is higher than American (7.3 percent) and Japanese (2.2 percent). At the same time the commercial deficit was also worse than that of the United States, while Japan continues to rake up a surplus.

The French economy has been strongly affected by the European crisis. Germany, Italy and Spain are in full recession, the British pound, the lira and the peseta have been devaluated, France must keep short-term interest rates high to defend franc/German mark parity.

Aggravating these intra-European difficulties is the under-evaluation of the dollar, giving American products a strong competitive edge on the international markets.

The recession tends to discourage cooperation enthusiasm among European countries, although more than ever needed to survive the trade war now materializing between the United States and Europe in the form of GATT negotiations.

2) Specifics of the aeronautical and space industries

The volume of orders received by aerospace enterprises depends partially on geopolitical tensions and partially on economic growth. Together, these two factors determine the investments made by defense ministries and airlines.

a) Military activities

Following the dissolution of the Warsaw Pact, various armament non-proliferation agreements were signed. These were inevitably followed by massive cut-rate weapon sales, reduction of all Western defense budgets (at an average rate of -4 percent annually). Such was the situation in 1992.

For the past three years, the French defense budget has been steadily cut back globally. Under Chapter V, which more specifically refers to equipment, and hence, to the work loads of French enterprises, there have been two different types of cut-backs:

—The first, a reduction of 10 billion French francs [Fr] in credits over three years. The Fr108 billion allotted under Chapter V in 1991 is now down to Fr100 billion for 1993, a decline of 8 percent in value.

—The second reduction is a discrepancy that has appeared in the past few years between the budget voted and the budget applied. Of the annual credits allotted under Chapter V, 5 percent have been frozen or canceled.

armaments exports throughout the world have regularly dwindled, from \$46 billion in 1987 to \$22 billion in 1991, a contraction of nearly 50 percent.

There is still room for hope, however, as many nations most still defend their independence.

b) Civil activities

The deregulation in air fares that we have witnessed over the past 10 years, combined with a decline in air travel has directly led to the financial and commercial destabilization of airlines.

The 1990 Gulf War, a period of heavy investment, dealt a blow to airline fleet renewal or enlargement policies, and for the past three years they have been in the red.

The high loss in orders was then aggravated for European aerospace manufacturers faced with an unprecedented economic clash with the United States, and a dollar which trades well (20 to 25 percent) below its true value. Although a compromise was reached in July 1992 between the European Community and the United States regarding direct and indirect government aid for large carrier craft, this compromise is now being renegotiated by the Americans under the GATT agreements; Europeans, on the other hand, were eager to implement agreements and extend them to other fields.

II) Data

1) Deliveries

a) Revenue

Initial assessments for 1992 indicate that consolidated revenue (CR Consolidated Revenue = total CR minus deliveries among manufacturers) fell by 1.5 percent in value (current francs) to the level of Fr101.4 billion and

by -4 percent in volume (according to INSEE [National Institute for Statistics and Economic Studies] in terms of 1992 (re-evaluated francs)).

This is the first time in 30 years that turnover growth has been negative.

The three major branches of the profession have experienced the slump differently. Only airframe manufacturers announce a slight growth in overall results.

While equipment manufacturers have had better export results than the airframe manufacturers, their revenues on the domestic market have not been as good. This explains the drop in nonconsolidated turnover for equipment manufacturers between 1991 and 1992.

Motorist deliveries have declined on both the domestic and export markets.

In 1992 civil deliveries declined by 1.8 percent and military deliveries by 1.2 percent. A drop in civil activities is unprecedented. On the other hand, the decline in military turnover started in 1991 continued throughout 1992 but at a slower rate.

b) Export turnover

Export turnover increased in value by 4 percent in contrast to domestic turnover which declined 6.1 percent in value.

This export increase is due to recovering military exports. The 1991 trend seems to have reversed but it is probable that 1992 was an exceptional year. After a decline in value of 36.1 percent in 1991, military exports recovered in 1992 by 24.4 percent, owing, notably, to the end of disputes with certain foreign countries and the conclusion of sales.

Civil export deliveries contracted in value by 4.1 percent against a growth of 26.1 percent in 1991. This directly reflects the financial problems of the airliners.

2) Orders

At Fr112.116 billion (Fr94.711 billion for consolidated orders), total orders were on the upgrade by 21.6 percent in value and 19.1 percent in volume.

The growth in bookings by the French aeronautical and space industry reflects an increase in military orders (+54.7 percent in value), and, notably, military exports (+211.3 percent in value) following a large order for the Mirage 2000-5.

For the first time since 1985, total civil orders have fallen below the 40 percent mark, while military orders experienced a 63 percent surge.

A comparison of domestic against export orders shows strong growth in exports (+39.5 percent in value) which brings final exports to 60 percent. Growth in orders between 1991 and 1992 is, however, relative, and it must not be forgotten that 1991, taken as reference year, was

particularly bad in terms of orders, with GIFAS member firms reporting a general decline of 30 percent. A comparison of non-consolidated bookings in 1992 against the 1987-1990 period during which the average value was Fr134 billion (re-evaluated francs), the loss in orders between these years and 1992 would be 16 percent.

All three major branches of the industry had increased non-consolidated bookings (exports plus domestic) owing to excellent export performance, but, all in varying proportion. Only airframe manufacturers showed a growth in domestic orders.

Order books can sustain two years of production, but fabrication will now be diluted over a much longer time.

3) Development of product market

a) Civil

In spite of a decline in air traffic since 1990 and regardless of the world slump, airlines continued to wage fare wars to safeguard their markets. This further penalized their financial positions. In 1992, the total deficit of airlines all over the world was \$4.8 billion.

Faced with this crisis and huge numbers of empty seats, airlines have been obliged to cancel or postpone orders made during the good years of the civil market, 1988-1989. (On the average (in terms of value), GIFAS had overall growth in civil orders of 47 percent for each of these years.)

In spite of the slump, the European AIRBUS consortium has managed to maintain its position, partially to the detriment of America's second most important manufacturer, McDonnell Douglas.

The level of orders in 1992 was better than in 1991. The European consortium booked an additional 136 orders (against 101 in 1991), which gives it 31 percent of the world market for aircraft having more than 100 seats.

With 157 aircraft delivered in 1992 against 163 in 1991, revenue was \$7.3 billion, more or less the same as the preceding year.

The AIRBUS consortium has, nevertheless, been hit by the financial straits of the airlines and in 1992 had 95 cancellations.

In the field of commuter aircraft, the Franco-Italian joint venture ATR [Regional Transport Aircraft] saw turnover drop 11 percent, with 51 aircraft delivered in 1992. During that period, only 20 firm orders were booked and order books stand at 81 aircraft pending delivery, which represents a work load of 15 to 16 months.

In February 1993, ATR once again had excellent results in the United States, where commuter lines ordered 28 ATR 72-210s, for a total value of \$400 million.

Now, North America accounts for nearly 37 percent of ATR's business and it has claimed 21 percent of the world market for commuter aircraft of the 30 to 70 seat category.

With regard to executive aircraft, Dassault Aviation has sold 1100 Falcons of different models (15 percent of the private aviation market) in 60 countries in the past 30 years.

Of the 122 Falcon 900s sold, over 60 went to the United States, and 230 Falcon 50s have been sold.

With its Falcon 2000 (14 firm orders and some 50 options), Dassault hopes to increase its share of the market for top of the line business aircraft.

For 1992, civil products are estimated at 25 percent of total revenue.

As far as helicopters are concerned, in 1992, the Franco-German group Eurocopter booked a total value of around Fr15 billion worth of orders of which 90 percent for export.

At present, two major military helicopter programs are in development, the NH 90 and the Tigre.

b) Military

In 1992, disarmament continued on the international level and defense budgets were cut-back, although various localized conflicts continued to rage.

In the field of military aircraft, no order was received from the French Government for the Mirage 2000 in 1992. A decision was made, however, to transform 37 Mirage 2000 air defense aircraft to 2000-5 standard.

With this updating of the French fighter and a substantial foreign order for 60 Mirage 2000-5s, it may be hoped that other exports will materialize in the next few years.

The French Air Force will be flying 139 Rafales in the two-seat version and 95 in the single-seat version. Another 86 of these aircraft will be ordered by the Navy Air Force.

French motorists and equipment manufacturers have been the real victims of cancellations and order reduction in civil and military aircraft and helicopters.

4) Commercial balance

Import data is not yet available, nor have figures been supplied by those official organizations that tally off-shore purchases made by French aeronautical sources (the government, airlines). Consequently, it is not yet possible to report the commercial balance of the profession. The aerospace field is expected, however, to remain at the forefront of industries that contribute to a positive commercial balance for France.

5) Personnel

The significant cut-back in activities for the 1992-1993 period has brought with it a serious employment problem. Inevitably, there will be layoffs and a near freezing in hiring.

Within the industry there have been 9,000 job losses in over two years (31 December 1990 to 31 December 1992). In 1992 alone, over 7,000 jobs were closed leaving the total estimated work force at 111,600 persons as of 31 December 1992.

Special social measures were negotiated with the public authorities and social partners, to find new jobs where possible, for those that had to be eliminated.

More job losses are expected in 1993.

It is hoped that new measures will limit unemployment (partial employment, salary agreements). According to enterprises, non-working days could represent from 5 to 10 percent of work days in 1993. The partial employment method could make it possible to maintain 3 percent of the total work force as temporaries.

6) The outlook for 1993

According to an econometric analysis made by GIFAS, there will be a 7 percent decline in 1993 revenue.

If European, and particularly, French, aeronautical and space capacity is to be maintained, it will be necessary to proceed with a general mobilization on government levels as well as on administrative and industrial levels.

It will not be possible to protect the coherence of this industry unless adopting a vigorous policy in favor of research and export.

AERONAUTICAL AND SPACE STATISTICS FOR 1992 (Estimated)

| | | 1991 | | 1992 | |
|-------------------|--------------|-------------------------------|-------------------------------|-------------------------------|-------------------------------|
| | | Nonconsolidated | Consolidated | Non consolidated | Consolidated |
| DELIVERIES | TOTAL | Fr119,283 million | Fr101,391 million | Fr121,101 million | Fr102,909 million |
| | Domestic | Fr62,084 million | Fr44,192 million (44 percent) | Fr66,125 million | Fr47,933 million (47 percent) |
| | Export | Fr57,199 million | Fr57,199 million (56 percent) | Fr54,976 million | Fr54,976 million (53 percent) |
| | Civil | Fr62,911 million (53 percent) | | Fr64,049 million (53 percent) | |
| | Military | Fr56,372 million (47 percent) | | Fr57,052 million (47 percent) | |
| ORDERS | TOTAL | Fr112,164 million | Fr94,711 million | Fr92,204 million | Fr77,857 million |
| | Domestic | Fr54,947 million | Fr37,495 million (40 percent) | Fr51,184 million | Fr36,837 million (47 percent) |
| | Export | Fr57,216 million | Fr57,216 million (60 percent) | Fr41,020 million (53 percent) | |
| | Civil | Fr41,622 million (37 percent) | | Fr46,624 million (51 percent) | |
| | Military | Fr70,542 million (63 percent) | | Fr45,589 million (49 percent) | |

Figures pertaining to 1992 are estimates based on a sampling of 90 firms representing over 95 percent of French aeronautical and space activities. Although probably close to final figures, these figures may not be considered final.

NON-CONSOLIDATED AERONAUTICAL AND SPACE REVENUE

TOTAL TURNOVER (export + domestic) (in current francs)

| | Aircraft and missiles | Power Plants | Equipment | TOTAL |
|----------------------------------|-----------------------|--------------|-----------|---------|
| 1991 | 64,534 | 26,804 | 29,763 | 121,101 |
| 1992 estimated | 66,826 | 24,651 | 27,806 | 119,283 |
| Variations in value (in percent) | 3.6% | -8.0% | -6.6% | -1.5% |

EXPORT

| | | | | |
|----------------------------------|--------|--------|-------|--------|
| 1991 | 33,169 | 14,589 | 7,218 | 54,976 |
| 1992 estimated | 35,414 | 13,957 | 7,829 | 57,199 |
| Variations in value (in percent) | 6.8% | -4.3% | 8.5% | 4.0% |

DOMESTIC

| | | | | |
|----------------------------------|--------|--------|--------|--------|
| 1991 | 31,364 | 12,216 | 22,546 | 66,125 |
| 1992 estimated | 31,412 | 10,694 | 19,978 | 62,084 |
| Variations in value (in percent) | 0.2% | -12.5% | -11.4% | -6.1% |

Sources: 90 GIFAS member firms representing around 95 percent of total revenue; Statistics, Econometrics, Budget Department

AERONAUTICAL AND SPACE ORDERS

TOTAL ORDERS (export + domestic) (in current francs)

| | Aircraft and missiles | Power Plants | Equipment | TOTAL |
|----------------------------------|-----------------------|--------------|-----------|---------|
| 1991 | 51,695 | 16,211 | 24,298 | 92,204 |
| 1992 estimated | 69,323 | 17,360 | 25,480 | 112,163 |
| Variations in value (in percent) | 34.1% | 7.1% | 4.9% | 21.6% |

AERONAUTICAL AND SPACE ORDERS (Continued)

TOTAL ORDERS (export + domestic) (in current francs)

| | Aircraft and missiles | Power Plants | Equipment | TOTAL |
|----------------------------------|-----------------------|--------------|-----------|--------|
| EXPORT | | | | |
| 1991 | 28,156 | 7,214 | 5,650 | 41,020 |
| 1992 estimated | 39,834 | 8,358 | 9,024 | 57,216 |
| Variations in value (in percent) | 41.5% | 15.9% | 59.7% | 39.5% |
| DOMESTIC | | | | |
| 1991 | 23,539 | 8,997 | 18,648 | 51,184 |
| 1992 estimated | 29,489 | 9,002 | 16,456 | 54,947 |
| Variations in value (in percent) | 25.3% | 0.1% | -11.8% | 7.4% |

Sources: 90 GIFAS member firms representing around 95 percent of total revenue; Statistics, Econometrics, Budget Department

France: Future of Passive Components Industry Analyzed

BR2705150593 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 13 May 93 pp 38-39

[Interview with Marc Henri-Biabaud, president of the French Passive Components Association, by Jean-Pierre Della Mussia; date and place not given: "Passive Components Industry Is Preparing for Recovery"; first two paragraphs are *ELECTRONIQUE INTERNATIONAL* HEBDO introduction]

[Text] For more than two years now, the French passive components industry has been aware that it must prepare for a "change," with regard to both its products, which must first of all become multifunctional, and its size: New growth can only be generated by companies or consortia earning revenues worth several hundred million francs.

Marc Henri-Biabaud, president of the French Passive Components Association, explains that this restructuring phase has largely begun.

[Della Mussia] What are the reasons behind the main problems facing the passive components industry?

[Henri-Biabaud] Our problems are the result of two different simultaneous events: On the one hand, an economic crisis which has hit us very hard; on the other hand, technological change has been much faster than we had foreseen.

The French passive components industry has no doubt been operating in an overly "French" environment, responding to specific needs, such as those of the military and aerospace markets.

That is why we are now going through a phase of reconversion which, unfortunately, is likely to last three to five years.

[Della Mussia] How do you view the change in the passive components market?

[Henri-Biabaud] It is clear that there are now three different product "levels." First of all, there are components like resistors or capacitors, for which the type of industry and, in particular, the type of investment is becoming increasingly similar to the semiconductor market. The position of French industry has become very weak in these products, and we no longer have a growth market, such as consumer electronics products, capable of relaunching the industry.

The second level consists of products requiring certain local services, such as connectors and printed circuits. In this field, we are fortunate to have such services available locally in France and Europe, and more of such services are likely to emerge in the future. For industries like these, however, it should be kept in mind that the minimum investment is 50 million French francs [Fr], something that is not within reach of every company.

The third level consists of specialty products from small companies, for example, toric transformers, customized cables, and surface acoustic wave filters. Several of our industries are internationally successful in their specialty, but life is not easy for them: They must invest constantly to maintain their position.

[Della Mussia] Does the French passive components industry as a whole possess the willpower to meet the challenge of international competition?

[Henri-Biabaud] Much more than you think. There are at least 30 manufacturers in the management committee of our association who want to fight and who are taking action. We have also taken steps to help small- and medium-sized passive components companies meet all their general needs and to help them face their responsibilities. Our annual meetings at Deauville feature the participation of all those who are concerned with passive components, and have become an exchange forum where we lay all our cards on the table, particularly with our

customers. We have also had an outside study conducted on passive components in Europe to get a better idea of what we must do.

[Della Mussia] So, what changes are you preparing for?

[Henri-Biabaud] The three basic changes are "rationalization," "polarization," and "reconversion to the markets of tomorrow."

The passive components industry must in fact follow—if not anticipate—present technological trends, such as miniaturization, integration, and generalization of multifunction components.

These technologies imply a mastery of new materials, of the science of heat diffusion, and of simultaneous technologies for multifunction components, such as connectors with both a filter and an optical section, or special keyboards. These multifunction components will probably be created by consortia of several companies in the form of joint ventures, economic interest groups, or other structures leading to solid inter-company links.

[Della Mussia] Are mergers and associations accelerating in France at the present time, with a view to these reconversions?

[Henri-Biabaud] This is not the kind of operation that you can just order by decree. Systematization is rarely successful. With our association, we can only attempt to offer more opportunities to get together and become aware of problems. You know, it is hard for manufacturers to admit that nothing will ever be the same. But mergers and associations are in fact being prepared.

[Della Mussia] What is the attitude of components consumers vis-a-vis the French passive components industry?

[Henri-Biabaud] At the present time, we are trying to change our customers' attitudes. They want to get us involved in their projects more than ever before, and that is a good thing, because if we tackle the problems upstream we can offer more personalized services that are better suited to the needs of the client. The components industry is offering increasingly more functionalities.

All our customers tell us they are going to cut down the number of their suppliers. However, on the one hand, they do like a certain closeness, and, on the other, they like direct contacts with the consultancy agencies.

[Della Mussia] Will tomorrow's passive components be the same as today's?

[Henri-Biabaud] Probably not. Since they fulfill different functions, there will be a tendency to offer them in the form of modules integrating active components, offering complete functions, just like certain optical connectors today.

[Della Mussia] Will manufacturers in the passive components industry take action on a European scale?

[Henri-Biabaud] We are in fact creating a European passive [components] committee—called the Policy Committee—within the EECA [European Electronic Components Association], aimed at helping European manufacturers to get to know each other better, and at making Europe—particularly Brussels—aware of the strategic importance of passive components.

This committee will have representation in Brussels and will make its voice heard, since it will be the expression of united interests capable of forming a significant critical mass. We would particularly like to see the launching of an EC research program in this sector, since nothing has been done so far.

[Della Mussia] Is not the passive components sector in France assisted by the public authorities?

[Henri-Biabaud] Very little. For an industry with revenues worth Fr9.6 billion in 1992, the Ministry of Finance granted loans worth some Fr20 million, and the credits from the Ministry of Research amounted to approximately Fr7 million. However, while we are sorry about the small amounts involved, we would like to see general measures to encourage companies, such as shorter payment periods or reduced charges.

[Della Mussia] Can we have faith today in a future recovery of the French passive components industry?

[Henri-Biabaud] Absolutely. The problems have been identified, the solutions are known, and inter-company and European projects have been launched. We are convinced that demand from the electronics industry for passive components in future will be very great, even if it differs from today's demand.

We can assure you that the ideas and the skills exist. One must not forget that in France we have European-level centers of excellence, particularly for certain types of printed circuits, connectors, and keyboards, to mention just the most important ones.

France: Electronics Industry Official on Situation
BR2705085793 Paris ELECTRONIQUE
INTERNATIONAL HEBDO in French 13 May 93
pp 24-25

[Interview with Jacques Bouyer, president of the French Electronics Industries Association, by Jean-Pierre Della Mussia; date and place not given: "French Electronics Industry Is Still Competitive, but Its Fate Is in the Hands of Political Forces"; first paragraph is ELECTRONIQUE INTERNATIONAL HEBDO introduction]

[Text] Even in the current crisis, the French electronics industry as a whole is becoming more competitive compared to its European partners. This is proven by the improvement in its European trade balance. However, as regards the rest of the world, the situation is largely

negative because of factors which have nothing to do with electronics. According to Jacques Bouyer, president of the French Electronics Industries Association (GIEL), the fate of the French electronics industry has never been so linked to general policy decisions, in particular those made in Brussels.

[Della Mussia] What is the state of the French electronics industry?

[Bouyer] Everything depends on the context you look at. In a purely European framework, I have no worries: In 1992, our trade balance with Europe as a whole was 130 percent, and this figure is improving. (More details should be provided today in a news conference organized by GIEL. They will be published in our next issue.) So, let us stop getting worked up about an alleged decline in the French electronics industry: We are fully competitive in our economic region.

However, our economic region as a whole is not competitive, which explains the poor electronics trade balances of only 4.3 percent with Japan, 24.1 percent with the United States, and 25.7 percent with the "four dragons."

[Della Mussia] So, the problem is not linked to the electronics industry?

[Bouyer] It is when our trading partners make electronics an economic priority. Japan and the "four dragons," for example, have virtually closed their markets to the European electronics industry to protect their own manufacturers. But the problem is not specific to electronics: Unlike Europe, Japan and the United States benefit from a single market rather than a federation of markets bracketed together. They benefit from major economies of scale, as can be seen from the U.S. defense policies. As for the "four dragons," the problems are about social and cultural differences. As Europe will never accept a lower standard of living, we have to compensate cost differentials in some way: We have to make savings somewhere!

[Della Mussia] How can we compensate?

[Bouyer] We have to accept that the so-called developing countries must progress, otherwise one day there will be the risk of war. But this progress cannot be made to the detriment of other areas, namely Europe. Therefore the solution to the problem is a political one. The wisest approach is to adjust some of our customs duties to protect some of our manufacturing industries. Increasing customs duties may seem a backward step to some, but the only other solution—increasing VAT [value-added taxes] on the products involved—would affect both French and foreign products equally. Besides, contrary to conventional wisdom, higher customs duties would not necessarily penalize our exports of finished products: All we have to do is to "suspend" duties on imports of components aimed at the manufacture of equipment for export. (Components can be imported without customs duties if they are to be used in equipment which subsequently will be exported.)

[Della Mussia] In the current context, it is difficult to envisage Brussels deciding to increase customs duties.

[Bouyer] Certainly, but if nothing is done industries will increasingly relocate and, in doing so, empty Europe's electronics industry of its substance. So, we have to decide whether Europe wants to maintain an electronics industry where Europeans are in charge.

The British have adopted policies which deliberately put their electronics industry in the hands of foreign companies. At present this approach still appears shocking to mainland European companies.

[Della Mussia] Are custom duties the only possible political weapon?

[Bouyer] No. They are only a selective weapon to save this or that branch of industry. There are others which are more transparent politically, and which our competitors know how to use to excellent effect. Take exchange rates, for example. For years, Japan arranged things so as to have an undervalued yen in order to invade our markets with very competitive products. Then the yen was revalued when the Japanese decided to acquire Western companies. The Europeans did not react. Here is another example. Today the dollar is undervalued by around 25 percent. And the Europeans just stand by. It is an unbearable situation. Similarly, in Europe people hardly ever kick up a fuss about the enormous differences in interest rates between Japan, the United States, and Europe. This naivete is very expensive.

The single market, as we have said, is another political weapon. If the Minitel [French videotex system] had been European, European companies would have made 30 million Minitel terminals rather than 6 million. Moreover, the French, like most European countries, still have to drastically change their attitude when accepting foreign industrial companies on their territory. It absolutely is unacceptable that the taxpayers' money is used to create jobs in one region and destroy them in another. It is scandalous when subsidies are given to a Japanese company to manufacture printed circuits in southeastern France. The same is true of the subsidies given to a Korean company to make cathode-ray tubes in eastern France. In both cases, European production capacity already was excessive before the new plants were built. The people responsible for awarding subsidies should be capable of assessing the consequences of their acts and only accept products which do not yet exist in Europe.

[Della Mussia] So far you have not mentioned the need for European industrial policies. Is that deliberate?

[Bouyer] Industrial policies are indispensable, but they must not hide the greater importance of general European policies, as we just mentioned. Having said that, at present we are obliged to note the absence of any European program dedicated purely to electronics since the failure of the HD-MAC [high-definition television] program. This is regrettable, because programs allow

planning ahead, and therefore ambitious long-term investments...and a high probability of success at the international level. Current European electronics programs are dependent on other government programs (like the TGV [high-speed train], Rafale [fighter aircraft], etc.) or private programs (car, road infrastructure, etc.). Since the origin of these programs is not electronic, innovation is not always a driving force behind progress in the electronics industry itself. The current lack of will is becoming increasingly obvious in industrial policies: The GSM [general system for mobile communications] digital mobile phone is essentially a French-German initiative and invention, but for the time being a U.S. company is benefiting the most from it. So, let us answer the question frankly: Do we want a European electronics industry, yes or no? Are we ready to do something for it?

[Della Mussia] What "electronics program" could be launched today?

[Bouyer] It probably should be based on communications and portable electronics research. Car production is another possible field of action. It is a solid industry and has the same adversaries as us. However, I regret that television program manufacturers just cannot seem to understand that they have everything to gain from the technical innovations which we could provide. Among the development programs, we must not forget JESSI [Joint European Submicron Silicon Initiative], which remains top priority. Positive concrete results have been obtained by Philips and SGS-Thomson in particular. However, much remains to be done to guarantee a certain level of European independence in integrated circuits. Some sort of common working method should be instigated between European leaders, in particular.

[Della Mussia] With or without IBM?

[Bouyer] That question is no longer relevant, since IBM already is participating. In the critical field of semiconductors, however, we must act very prudently. Any international company can decide, from one day to the next, to change its global industrial network, for financial reasons for example. We cannot take risks with our strategic technologies.

[Della Mussia] Some Japanese observers explain our difficulties by a lack of motivation on the part of our leaders. Is this justified?

[Bouyer] I strongly deny these insinuations. We remain motivated. When we are not up against Asian companies, then we succeed. The proof is that we have a positive trade balance in electronics with Germany. We should not mistake occasional discouragement, due to the fact that we are working in a minefield, for a lack of motivation.

[Della Mussia] Are you optimistic that new electronics companies will be created in France?

[Bouyer] Jobs for life no longer exist. Our young people have trouble finding work. Experts are easier to find in

the labor market than in the past. This context encourages people to create "their own" company. The relative risk of doing so is diminishing. My forecast is that we will see more and more young people venturing down this path. No doubt this will be one of the rare positive consequences of the current crisis.

[Della Mussia] Is there a limit to the tendency to relocate production facilities that we are seeing today?

[Bouyer] We have to distinguish between two types of relocation. On the one hand, those intended to conquer local markets, and on the other hand defensive relocations which are explained by the need to lower costs. The second category should be temporary only. Because when an industrial company no longer has an industrial base, it loses the means to innovate. It changes identity.

[Della Mussia] Are you still as fervent a supporter of intra-European alliances?

[Bouyer] Alliances are now indispensable if we are to make progress. If we do not forge intra-European alliances, we will have to make them with other partners. And at the end of the day that would mean losing our identity.

France: Sextant Avionique's 1992 Revenues Drop 2 Percent

BR0806151593 Paris LA LETTRE DU GIFAS
in English 13 May 93 p 2

[Unattributed article: "Sextant Avionique: 1992 Report"]

[Text] The group felt the effects of a depressed market in 1992 with a decline in turnover of 2 percent compared with 1991. The slump is expected to continue through 1993 and no true recovery is expected before 1996. Under these conditions, Sextant Avionique has had to eliminate nearly 1,000 jobs and stabilize at a work force of 7,525 persons. This is in line with the schedule submitted in 1992 when devising a plan for improving competitiveness. In spite of the depressed market, Sextant Avionique was able to consolidate its market share and confirm its position as Europe's foremost manufacturer of electronic flight equipment. As expected, group figures show a definite improvement owing to the paring action undertaken at the end of 1991; the profit situation has balanced and net indebtedness is down by 620 million French francs [Fr]. Profits are back at Fr246 million after a loss of Fr92 million due, most notably, to the nonrecurrence of certain one-time provisions which heavily penalized 1991 profits.

Activities of the Sextant Avionique group are expected to decline considerably in 1993, particularly on the aeronautical market, because of the planned reduction in production rates of aircraft and helicopters. Important palliative steps were taken at the end of 1991 and the results should become apparent by 1993. Under these circumstances, the objective will be no more than breaking even in 1993 and just that will depend on

scrupulously continuing with these new efforts. Under the circumstances, the Board of Administration decided that there will be no dividend for 1992.

France: Sextant Avionique's Electronics Strategy Outlined

BR1006154093 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 27 May 93 p 26

[Report on interview with G. Menozzi, Sextant Avionique's technical marketing director, by unidentified journalist; place, date not given: "Avionics: We Must Standardize To Lower Costs!"]

[Text] Thanks to its standard modules and thick-film hybrid motherboards, Sextant Avionique is cutting by 25 percent the price of an application originally made up of SMC's [surface-mounted components] and a printed circuit.

"Integration implies the use of expensive technology, but since we in the avionics sector can only partially benefit from the volume effect to offset our development costs (some 100 items per year in military aviation and a few thousand in civil aviation), we have decided to develop standard modules," says G. Menozzi, Sextant Avionique's technical marketing director.

"Take, for example, the multichip 68020 module, which can be integrated into various navigation and flight control systems, or into mission computers," he explains. Some of these systems originally consisted of a highly complex printed circuit (up to 20 layers) and surface-mounted components, including QFP's [quad flat packs] with extremely fine interconnection pitches. "Today, these circuits tend to use thick-film hybrid technology fitted with chip carrier package components and our standard modules," says G. Menozzi.

"This way, it is 25 percent cheaper because not only is the hybrid easier to make (five screen printed layers), but there is no need for the QFP's, which are extremely expensive. These fine-pitch packages are now more expensive than the chips themselves, and at pitches finer than 0.635 mm, they become prohibitively expensive," he adds.

France: Alcatel-Espace's Space Electronics Strategy Explained

BR1006153793 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 27 May 93 pp 25-26

[Report on interview with A. Coello Vera, Alcatel Espace's payload electronics systems director, by unidentified journalist; place, date not given: "Hyperfrequency Circuits: 'Savings Through Thin-Film ASIC's Technology'"]

[Text] Payload satellite electronics systems must be as light as possible while remaining competitive and reliable, which is not easy in hyperfrequency circuits with very small production runs!

"We, too, are having to cut our costs today," says Augustin Coello Vera, Alcatel Espace's Payload Electronics Systems director. "It is a globalized market. The systems that sell will be those offering the best compromise between cost and weight," he says, adding that launching costs represent one-third of total satellite ownership costs (manufacturing and insurance make up the other two-thirds). That is a lot of money when you consider that every kg in a satellite costs approximately 300,000 French francs [Fr].

"Nor can we afford to make a mistake," says Coello Vera. "Once it has been launched, you cannot change the card. It must work! That is the problem with small production runs: They do not allow you to draw up malfunction statistics, as can be done for automobile electronics, for example," he adds. It should be noted, however, that the level of reliability aimed at today corresponds precisely to the lifetime of the satellite (three to 15 years, depending on the function). "Before costs were subject to so much pressure, we aimed at 100 percent reliability, and that was really very expensive."

"Our technological choices are intended to achieve both a weight reduction in the final application, and a cost saving in the system itself. Miniaturization is the only possible solution for us," he says, citing the example of a channel amplifier. "We managed to halve the weight and price by replacing the discreet components with three specific circuits made of gallium arsenide," he reveals. "Even though developing the circuits has been expensive, we achieved a much simpler system permitting us to make highly significant savings on control and testing operations, which account for one-third of all system costs. And the new system is just as reliable," explains Coello Vera.

The application uses an alumina substrate, and the circuit is manufactured using thin-film technology. "It is more expensive than thick-film technology, but is also better suited to hyperfrequencies. In particular, it allows us to minimize electrical loss, which—in the eyes of the client—largely compensates for the higher cost of the technology, because the lower the electrical loss, the lower the payload's energy requirements, and the lighter the solar panels of its power source. The weight question is really essential for us," concludes Coello Vera.

[Box p 25]

Same Objective Whatever the Technology: Integrate the Function To Cut Costs

The technologies utilized in manufacturing satellite payloads (a few units per year), in-flight navigation systems (several thousand products per year), and automobile modules (several hundred thousand units per year), vary as widely (thin film or thick film technology, printed circuits, etc.) as the applications for which they are designed.

However, the objective is always the same: reduce the bulk of the function to cut its cost.

Spain: Electronics Industry Earnings Fall 17 Percent in 1992

BR1106093793 Paris *ELECTRONIQUE*
INTERNATIONAL HEBDO in French 27 May 93 p 6

[Article by Didier Girault: "Spanish Electronics Sales Down 17 Percent in 1992"]

[Text] A bad year for Spanish electronics, which can no longer take advantage of the telecommunications boom.

Last year was one of the worst in the history of the Spanish electronics industry. According to the Spanish Association of Electronics Industries (ANIEL), 1992 earnings compared to 1991 fell 17 percent in local currency to approximately 57.3 billion French francs [Fr] (in December 1992: 1 franc equaled 21.7 pesetas). The market was already depressed in 1991. Overall earnings for the industry were below the 1988 level. Compared to 1991, Spanish 1992 electronics production also fell 14 percent to Fr28.5 billion. Imports dropped 13 percent to Fr43.7 billion. Exports were the only sector to record a rise (Fr14.9 billion, or up 4 percent). However, even this rise was less than that of previous years. The total trade deficit for the Spanish electronics industry now stands at Fr28.8 billion.

Components Sales Drop 12 Percent

According to ANIEL, 1992 sales for the Spanish telecommunications sector fell 30 percent (while exports increased by 19 percent) and production dropped by 27 percent. In the computer sector, sales and production dropped by 15 percent and 7 percent, respectively. Total earnings in these two sectors—representing more than half of all Spanish electronics production (Fr14.9 billion) and sales (Fr29 billion)—fell 21 percent compared to 1991 in both production and sales. Last year, for both sectors combined, imports fell 15 percent to Fr22 billion, while exports fell 1 percent to Fr7.9 billion, reversing the upward trend from 1987 to 1991.

The same trends are affecting consumer products sales and production (a 13-percent drop to Fr8.8 billion and a 5-percent drop to Fr5.7 billion, respectively); professional electronics (down 14 percent to Fr11.7 billion in sales; down 7 percent to Fr4.2 billion in production); electronics components (down 12 percent to Fr7.7 billion in sales; down 9 percent to Fr3.7 billion in production).

Spanish imports of consumer electronics products fell 4 percent to Fr6.7 billion, while exports rose 23 percent to Fr3.6 billion. In the professional electronics sector, imports (Fr8.9 billion) were down 14 percent, while exports (Fr1.5 billion) were up 4 percent. In components, imports fell 11 percent to approximately Fr6 billion, while exports fell 3 percent to Fr1.9 billion (here again, a drop broke the rising trend of previous years).

Spanish Electronics in 1992 (production, market, import, and export figures in million francs, followed by 92/91 difference in percentage)

| | Production | Market | Imports | Exports |
|--------------------------|-------------|-------------|-------------|-------------|
| Consumer electronics | 5705 (- 5) | 8825 (-13) | 6737 (- 4) | 3617 (23) |
| Color TV's | 4866 (- 5) | 3773 (-13) | 2103 (+20) | 3196 (27) |
| Electronics components | 3691 (- 9) | 7760 (-12) | 5966 (-11) | 1897 (- 3) |
| TV antennas | 643 (-10) | 878 (-17) | 362 (-19) | 126 (+16) |
| Components | 3048 (- 8) | 6881 (-11) | 5603 (-11) | 1770 (- 4) |
| Professional electronics | 4126 (- 7) | 11696 (-14) | 8946 (-14) | 1466 (+ 4) |
| Defense | 1250 (-18) | 1131 (-16) | 105 (-34) | 224 (-35) |
| Industrial electronics | 1774 (- 9) | 4793 (-11) | 3724 (- 14) | 705 (+22) |
| Medical | 363 (-11) | 3324 (+ 7) | 3134 (+ 9) | 173 (- 7) |
| Radio, TV broadcasting | 625 (-11) | 767 (-61) | 323 (- 76) | 181 (-20) |
| Instruments | 201 (-20) | 1679 (- 3) | 1659 (- 3) | 181 (-20) |
| Telematics | 14916 (-21) | 29051 (-21) | 22050 (-15) | 7915 (- 1) |
| Telecom | 9245 (-27) | 11015 (-30) | 4345 (-17) | 2575 (+19) |
| Computers | 5671 (- 7) | 18036 (-15) | 17705 (-15) | 5340 (- 8) |
| TOTAL | 28530 (-14) | 57334 (-17) | 43701 (-13) | 14896 (+ 4) |

One franc equals 21.7 pesetas (December 1992). The figures are rounded off, therefore, there may be a slight difference between the totals and the sum of the values per sector.

In the telecommunications sector, 1992 sales fell 30 percent while exports rose 19 percent. Telecommunications account for 19 percent of the Spanish electronics market, while data processing represents 31 percent.

France: Aerospatiale CEO Discusses "Economic War" Between US, European Aerospace Industries

93WS0519A Paris LE MONDE in French 08 Jun 93
p 31

[Interview with Aerospatiale CEO Louis Gallois, by Jean-Paul Dufour, Alain Faujas, and Jacques Isnard, date and place not given: "We Are Looking At An Economic War"; first paragraph is LE MONDE introduction]

[Text] Louis Gallois, the former principal private secretary of defense minister Jean-Pierre Chevenement, was named chief executive officer of Aerospatiale a year ago. He found the company in the grip of the kind of recession he had dealt with as head of the engine-maker SNECMA (National Aircraft Engine Research and Manufacturing Company), only worse. On the eve of the 40th Bourget Aeronautics and Space Show, the industry is suffering through some very lean times that have not left any of Aerospatiale's divisions intact. Neither missiles, nor helicopters, nor Airbuses are selling in large enough numbers due to deep cuts in military budgets and airline purchases. Even satellites, the only niche in good shape, lost 2.38 billion French francs (Fr) in 1992 and racked up debt of Fr16.5 billion. Yet Mr. Gallois is reasonably optimistic, for Aerospatiale is maintaining its market shares. With fresh cuts in staff and investments, he believes the company will be able to meet competition and deal with the government's plans to privatize it, provided that the latter carefully selects the new stockholders of a firm involved in national and nuclear defense work.

[LE MONDE] Aerospatiale figures on the list of national companies the Balladur government wants to privatize. How did you react to that announcement?

[Gallois] Without surprise. Privatization is not entirely new to us; we spun off our helicopters division into a joint subsidiary when we created Eurocopter with Deutsche Aerospace (DASA). I would also point out that when we brought Credit Lyonnais—also slated for privatization—on board as one of our chief shareholders at 20 percent, we took a first step in that direction. It broadens our range of potential capital investors.

The upcoming privatization will not change the way we work! We are steeped in international competition and its rules and constraints of profitability and competitiveness. Moreover, the fact that Aerospatiale is on the list of companies suitable for privatization proves that it is managed like any other firm.

We would like to see two things happen to insure a smooth transition to private status. The first is to find stockholders that share the group's long-term development objectives. The second is obviously financial: our balance sheet must brought back up to par, as were those of British Aerospace, Rolls Royce, and Messerschmitt (MBB) in similar circumstances.

[LE MONDE] Would you like your Fr16.5 billion debt forgiven?

[Gallois] A debt remains a debt. But because of it, our state shareholder did not consider itself bound in the past to provide the capital increases the company would have needed to grow. Recapitalization is now vital.

I might add that when the government decides on the non-capital part, or the share it would like to keep there, it will have to take into account the specific nature of our company, notably its defense work.

[LE MONDE] What do you think of the new quarrel the Americans are trying to pick with Airbus for its alleged unfair competition?

[Gallois] We are moving toward renegotiating the July 1992 agreement, which called in particular for limiting reimbursable loans to 33 percent of the total development cost of a new airplane. The Americans want to review everything in the agreement—even though it is very favorable to them—because they still think it restricts research subsidies, their favorite form of aid, too much.

We are, in fact, in an economic war in which the American arguments include research and export subsidies and the chronic undervaluation of the dollar.

The United States does not realize that their added value on each Airbus sold is greater than that of the French or Germans! The fact is that, deep down, they do not feel Europeans should be active in this cutting-edge industry.

[LE MONDE] Is that why they are using industrial espionage as an excuse not to come to the Bourget Show?

[Gallois] I haven't much to say about the subject. But, coming from the United States, it's funny! I might add that practically all the big American manufacturers will be there.

[LE MONDE] Do you think East European countries have a future in aeronautics and space?

[Gallois] In the long term, yes. I think that if only one industry survived in Russia, it would be aeronautics and space. The Russians will try to the bitter end to hang on to what they have built up in this area, where they have a fantastic tradition. You should see the incredible number of airplanes invented by Tupolev!

There are two ways they could survive. Either they operate outside all the rules, by selling anything and everything at just about any price to accumulate foreign currency. Or, with our cooperation, they get used to our

ways and capture their share of the market through healthy competition. We are therefore discussing airplanes, helicopters, and space programs with them. We will not commit large sums, except to help them certify and market their MI 38 helicopter. The MI 38 is a 13-ton, 30-passenger helicopter that does not compete with anything in Eurocopter's line.

In the space industry, the Russians are requesting talks on tariffs and quotas so they can break into the Western market for civil satellite launches. The negotiations concern the Americans, Europeans, and Russians, so we will have to find a three-way compromise.

When it comes to manned flights and space stations, the situation is less clear. Europeans are looking for solutions either with the Americans or the Russians. Europe will only be able to conduct valid discussion with either one when it has decided what it really wants to do. For now, programs are dictated solely by budget constraints. Europe no longer has an intelligible space program. It is time it reclarified its ideas.

[LE MONDE] After a 1991 fiscal year that showed slight profits of Fr213 million as a result of capital gains, your company slipped back into the red in 1992 with a deficit of Fr2.38 million. How would you analyze the future of your markets?

[Gallois] Except for space, they are bad. Ariane is doing well and, after a dip, satellite business has picked up nicely. We just won the Arabsat contract under good competitive conditions, and we have six major satellite programs underway. In contrast the other markets, whether civil or military, are, with a few exceptions—missiles are doing better than they were a few months ago—suffering a historic slump as a result of the collapse in military spending and the disastrous situation of airlines.

That said, Aerospatiale is well-positioned strategically. I am all the more comfortable talking about it as, having come on board in 1992, I had nothing to do with it. Our technologies are on par with the best in the world. For civil airplanes, Boeing and Airbus are the only two players; McDonnell Douglas is out of the picture. We hold 30 percent of the market for big commercial airplanes.

Aerospatiale has captured nearly 20 percent of the market for turboprop planes, equal to de Havilland's and Saab's share. We are second in the world in helicopters and number one in Europe for missiles and space. Our market shares are holding strong, which means that our product lines are solid.

Any talk of alliances must include Aerospatiale. And I would add—because it's a decisive factor—that our personnel is exceptionally motivated and competent. The group's climate is conducive to worker-management dialogue, a crucial asset, especially during tough times. So the company clearly has a future.

But we are having serious financial problems; our losses have reached an intolerable level and our debt has jumped from Fr14 to Fr16.5 billion in one year. So our goals are simple: to rebalance our accounts and check debt growth. If economic trends do not worsen again, we aim to break even in 1994.

[LE MONDE] How will you manage that?

[Gallois] By concentrating first on spending. There's no secret to it: Investments will be reduced to the bare minimum, stocks and cycles will be cut, operating expenses will be limited, and salary increases will be substantially "adjusted." Although we will continue our research and development to insure our future, we are working to decisively improve our productivity in that realm. At the same time, we have no choice but to pursue our efforts to adapt the group by reducing some jobs to part time and eliminating others in 1993.

It is also essential that we upgrade our sales approach. That means winning short-term orders, but most important, bringing the customer into the company in a more fundamental way.

We must also transform our organizations and make the company more adaptable, more responsive, and better able to anticipate needs and changes. To do that we are decentralizing—head-office management set the example—and pruning the number of echelons. This must be accomplished without sacrificing the qualities that make Aerospatiale strong: its internal synergies, which are very marked between the different businesses, and its ability to carry out highly structured, large-scale programs.

Finally, we will have to develop alliances of a new sort for us.

[LE MONDE] Namely?

[Gallois] Before, our alliances were centered around programs and the development of new products, but the partners remained independent. Now the priority will be to base them on cost-cutting and improving our competitiveness.

That is what will happen in the missiles industry, which has begun restructuring in Europe. But take the example of satellites as well. There are two consortiums in Europe. One of them, Matra-Marconi-Space, is highly structured. The other, which combines the interests of Aerospatiale and Alcatel-Espace for France, Alenia (Italy), DASA (Germany), and Loral (United States), is less so. The ties between us are not strong enough to meet the challenge of American competition. We must therefore bolster them, rationalize our organization, and probably go as far as creating a real company combining one or another partner with a single chain of command.

[LE MONDE] Aren't we seeing the rise of a certain imperialism on the part of Deutsche Aerospace (DASA), which might hurt your ATR line of regional transport planes in particular?

[Gallois] We have close ties with this group; 60 percent of our sales are made with DASA. We have noticed that the Germans are reviving their great aeronautics tradition. They are ambitious and they express their ambitions; there is nothing illegitimate in that. It is up to us to formulate our own ambitions. For regional transport planes, DASA bought out Fokker. We have begun discussions with them to see whether the Fokker, Dornier, and ATR lines can be brought closer together. We are approaching this discussion in a positive frame of mind, with just one objective: to develop the ATR and increase its market share.

[LE MONDE] What do you expect of the government in the military sector? Additional appropriations?

[Gallois] We are expecting above all an appropriations bill that gives us a long-term view of what lies ahead. Even if that means bad news and painful arbitration.

We hope the bill will allow us to develop our areas of technological excellence: ballistic missiles, ramjets for cruise missiles, attack and transport helicopters, observation satellites, and so on. In interviews with SCIENCE AND DEFENSE, defense minister Francois Leotard mentioned three new areas: simulation, information and command systems, and antimissile defenses. Those are three areas in which we have world-class expertise. We want to set up a dialogue with the defense ministry. The appropriations bill could be the framework for it.

Finally, we were thrilled with the minister's statements that he would provide us with export support. Indeed, at a time when the defense budget is shrinking, maintaining our manufacturing base depends directly on exports.

France: Soitec Halves Price of Silicon-on-Insulator Substrates

BR1606140193 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 3 Jun 93 p 29

[Article signed L.M.: "Soitec Halves the Price of Silicon-on-Insulator Substrates"]

[Text] The Grenoble-based Soitec Company is hoping to improve the market accessibility of silicon-on-insulator (SOI) substrates, which help solve a number of integration problems, by using a thinner insulation layer and thus reducing the cost of the product.

"Silicon-on-insulator is a dream substrate for resolving heat resistance or integration problems. At up to five times the price of standard silicon, however, its cost has been a prohibitive factor, especially in civil applications. By coming up with a "lighter" version at half the price, we are hoping that SOI will finally become more accessible," explains Jean-Michel Lamure, president of Soitec, a small- to medium-sized company based in Grenoble. Soitec is specializing in the production of SOI wafers and has become the number one on the European market after only 18 months of operation.

Improved Performance

The speciality of SOI devices lies in the fact that the silicon used for the circuit is separated from the substrate by an insulating layer of silicon dioxide. As a result of this, the different elements within the integrated circuit can no longer interfere with each other via the silicon, thus improving overall performance. The SOI wafers are obtained by implanting high doses of oxygen (1.8 quintillion ions/cm²) into a conventional layer of monocrystalline silicon. The wafer is then annealed at a very high temperature (six hours at 1,320° C) to obtain a monocrystalline silicon surface layer with very symmetrical interfaces. In order to achieve a "lighter" version of the product, Soitec has "simply" reduced the thickness of the substrate's insulation layer by reducing the oxygen implantation time. "The thickness of the silicon dioxide layer is typically 200 nm [nanometers] and that of the monocrystalline silicon 400 nm. In the "light" version these figures have been reduced to 100 nm and 85 nm, respectively. Given that the production cost of the wafers is directly proportional to the duration of the oxygen implantation process, the "lighter" version is less expensive to produce. SOI is especially well known for its resistance to radiation in military and space applications, but its main attraction today lies in its allowing the development of otherwise impossible circuits," explains J.-M. Lamure. "Due to the insulation layer, SOI substrates eliminate all circuit element interference. It then becomes possible to integrate various, less compatible technologies into a single circuit, e.g., conventional and power electronics, a large number of transistors, or even a sensor and its electronics. These technologies cannot always be combined on a standard substrate," he continues. "SOI substrates are more appropriate than silicon technology to further reduce the geometry of integrated circuits. Some manufacturers are suggesting that only SOI will allow the industry to cross the 0.25 micron benchmark," explains J.-M. Lamure. "SOI substrates also increase the usability of integrated circuits to temperatures as high as 300°C. Certain automobile manufacturers are interested in SOI technology for the manufacture of engine equipment subjected to high operating temperatures."

[Box]

Second Place Worldwide Within 18 Months

Soitec has existed for less than 18 months and is already in second position worldwide in the field of silicon-on-insulator substrates after the U.S. company Ibis. Andre Auberton-Herve and Jean-Michel Lamure had been running SOI operations at LETI (the Grenoble-based Electronics and Information Technologies Laboratory of the Atomic Energy Commission) for eight years before setting up Soitec on 1 March 1992.

Eight months later, Soitec achieved revenues of 9 million French francs [Fr] by capturing a large part of the European market (80 percent) and a significant part of the Japanese market (25 percent). Jean-Michel Lamure,

Soitec's president, is expecting 1993 revenues to reach Fr15 million. In order to attain this objective, Soitec will also penetrate the U.S. market via its recently created subsidiary, Soitec USA. However, "this will be more difficult as Ibis has been operating there for six years," admits Jean-Michel Lamure. [end of box]

[photo caption, photo not reproduced] The SOI wafers are obtained by implanting high doses of oxygen. The ion implantation equipment used is Eaton's NV200. Soitec's main competitor, Ibis, uses the same equipment.

France: Alcatel Purchasing Director Outlines Strategy

BR1806150693 Paris *ELECTRONIQUE*
INTERNATIONAL HEBDO in French 3 Jun 93
pp 20-21

[Interview with Jean-Marc Pernet, Alcatel corporate purchasing director, by Frederic Fassot; date and place not given: "We Are Cooperating More and More With Our Suppliers"; first paragraph is *ELECTRONIQUE INTERNATIONAL HEBDO* introduction]

[Text] Alcatel maintains privileged relationships with fewer than five ASIC [application-specific integrated circuit] manufacturers, but with more than 100 manufacturers of standard components. Jean-Marc Pernet, corporate purchasing director, unveils his company's "ground rules" for us.

[Fassot] What types of cooperation do you establish with your electronics components suppliers to assure steady supplies?

[Pernet] You have to distinguish specific components from standard components. For the first—which almost always play a strategic role—cooperation is much more extensive. It begins with the product design and requires the transfer of design rules and cell libraries between the supplier and our group, as well as an agreement on the CAD [computer-aided design] tools to be utilized. These tools should preferably be "open," that is, available on the market.

[Fassot] Do you do this so that you systematically have a second choice available for your specific circuits?

[Pernet] Sometimes, but not always, since we may use cell libraries owned by the first supplier. In fact, the number of specific circuits that we use is very high, and the annual production volume of most commonly used circuits is more than 7 million units. Under these conditions, the best solution is to have an integrated circuits supplier that belongs to the group, such as MIETEC [Microelectronics Technology, Belgium], and which is perfectly in phase with the new processes, libraries, and tools of one of our principal suppliers (SGS-Thomson, Ed.). Of course, this does not rule out cooperation with other suppliers if they have attractive components or libraries. But the number of such suppliers is limited—

you can count them on the fingers of one hand—since the adaptations to be made in every case cost time and resources.

[Fassot] What is Alcatel's policy on standard components?

[Pernet] For standard components, whether they are active, passive, or electromechanical, cooperation is not as close where design is concerned, but it is just as important with regard to reliability, logistics, and marketing. We draw up annual—or sometimes multianual—agreements with more than 100 suppliers of standard components. This type of agreement sets the standards for quality, regularity, as well as flexibility of delivery and price. The base currency used is generally that of the supplier's parent company. We agree on a provisional quantity and guarantee the supplier a percentage of our industrial requirements. Every Alcatel location is free to add particular conditions to the basic contract in predefined areas, for example, logistics or payment conditions.

[Fassot] Where do you purchase your standard components?

[Pernet] As far as possible, we favor manufacturers with a broad European design and manufacturing base, since that is where our principal needs are, although our growth is faster in Asia. However, we naturally buy all over the world. For DRAM's [dynamic random-access memories], we buy in Japan, Korea, the United States, and Europe; for EPROM's [erasable programmable read-only memories], in Europe and the United States. Our printed circuits are 50 percent supplied internally at our three main European units, including Alcatel CIT Coutances. The other 50 percent are purchased mainly in Europe.

[Fassot] What general criticism could you make about your suppliers?

[Pernet] Fortunately, our suppliers do not all have the same good or bad points, otherwise life would be impossible for the purchasers.

However, if we were to look for the most widespread fault in electronics components, I would say that the streamlining measures carried out by our suppliers, such as changing sites, are not always very efficient where technology, production capacity, and logistics are concerned. The result is a disruption of supply and costly quality problems. In this regard, the electronics components industry has not yet reached maturity.

France: Alcatel's Components Purchasing Policy Analyzed

BR1806151093 Paris *ELECTRONIQUE*
INTERNATIONAL HEBDO in French 3 Jun 93
pp 20-21

[Article by Frederic Fassot: "Some 1,400 People To Manage 46 Billion French Francs' Worth of Alcatel Purchases"]

[Text] The Alcatel purchasing division, which has 2,300 suppliers each delivering 2 million French francs [Fr] worth of supplies every year, manages more than Fr9 billion in electronics components supplies and cannot afford to leave anything to chance.

"It is essential that Europe be strong in electronics components. Our study bureaus are, of course, located mainly in Europe, and experience has shown that it is easier to coordinate a supplier's strategy with ours when the supplier has a major, or at least a very important, location on this continent," says Jean-Marc Pomet, corporate purchasing director at Alcatel, the telecommunications subsidiary of the Alcatel Alsthom group.

The job is not an easy one for the person responsible for supplies purchases at one of the world's largest telecommunications hardware manufacturers. In 1992, the company's purchasing volume was ECU7 billion (approximately Fr46 billion) for a sales figure of ECU16.1 billion. Electromechanical and electronics components represent the main expenditure at Alcatel (21 percent of purchases in 1992), followed by copper (19 percent). Subsystems, in turn, represent 13 percent of the total (also including services, purchases and rentals of equipment, other materials, etc.).

The group's purchasing division employs 1,400 people, managing deliveries to production sites in 25 countries. The telecommunications giant has no fewer than 2,300 suppliers, each of which earns a turnover of more than Fr2 million with the group. Supplies management is in keeping with the volume of transactions and maintains an fair balance between centralized decisionmaking and autonomous management of the various subsidiaries. A highly international team of 20 people, located in Paris, is at the helm of this division; its policies are approved by a committee involving the purchasing directors of the principal geographical subsidiaries, which meets every four months.

Some 100 Product-Range Chiefs

Once purchasing policies are defined and approved, they are implemented by a decentralized team of 100 product-range chiefs. Although they belong to subsidiaries of the group, these product-range chiefs speak for the group as a whole when it comes to the product they represent. They establish essential upstream relationships with the research departments before choosing suppliers; they take stock of the needs of various subsidiaries; they negotiate annual or multiannual supply contracts and follow up on execution. They are assisted in their work by two organizations: The first is responsible for components rationalization. The team consists of research engineers who are decentralized among the subsidiaries and work in networks to provide uniform components codes and draw up lists of technically qualified products/suppliers likely to be used. The second organization consists of the joint international purchasing departments (the main ones are located in Tokyo, Hong Kong, Singapore, Washington, and Paris). At the request of the

product-range chiefs, these departments perform a variety of functions linked to the preparation or execution of purchasing contracts: monitor technology developments, find new suppliers, subcontracting follow-up, shipping in countries where the supplier distribution network may be inefficient; and technological validation of supplier manufacturing units.

Centralized Supplier Performance Evaluation

To allow all staff members throughout the world to work and communicate with each other along networks, Alcatel has created two principal information systems. The first system is used by purchasers, who enter their projected requirements. These projections are entered into a database and processed by the product-range chiefs. After negotiations—which usually are held annually and sometimes quarterly (as is the case with memories)—the database is updated with information on prices, available suppliers, and logistical delivery conditions. This information is accessible by local users (350 people can access it). The orders are then placed locally in accordance with the contracts.

In addition to this purchasing information system, there is a technical information network which supports the activities of the technical team responsible for product coding standardization.

Lastly, the results of the organization as a whole are monitored by means of management information systems concerning budget obligations for production materials and follow-up, changes in the number of suppliers, changes in staffing and supplies costs, etc. The suppliers, whose performance until now has been evaluated locally and not at the overall group level, will see their performance ratings increasingly being taken care of globally. As a result, these ratings can more easily be taken into account when negotiating contracts.

EAST-WEST RELATIONS

Italy: Experiment Developed for Russian Space Mission

MI0206093393 Rome SPAZIO INFORMAZIONI
SPAZIO ITALIA Supplement in Italian Mar 93
pp 26-27

[Article by Prof. Vittorio Formisano, director of research at the CNR's IFSI: "An OPERA In The Magnetosphere"]

[Text] The OPERA [Auroral Radiations And Plasma Waves] experiment will be launched next 30 November on board the Russian Space Agency's satellite Interbol. The launch will be effected by a Proton carrier and will take place at the Baikonur spaceport in Kazakhstan. This will be the conclusion of the first joint space adventure between Italian and Russian scientists that started a

good seven years ago. The OPERA will be the first experiment produced in Italy to fly on board a Russian satellite.

The Interbol mission, now under the Russian Space Agency, started some 10 years ago as the result of a proposal made by the Space Research Institute (IKI) in Moscow to the Soviet Academy of Sciences. It was a Soviet mission but it was open to the collaboration of western scientists. The goal of the mission was, and is, to study the physics of the earth's magnetosphere, the magnetic cavity that is created by the interaction of the solar wind and the earth's magnetic field.

The Interbol Mission

The Interbol mission is made up of four satellites: a main probe in the geomagnetic tail (called the Tail Probe) and another main probe that will study the boreal auroras from above (called the Auroral Probe); the two probes will be accompanied by two subsatellites, that are the result of a Soviet-Czechoslovakian-Hungarian effort. The two subsatellites are very important because, though rather limited from the instrumental point of view, they can separate the dimensions of space and time in the events being studied by means of measurements that are similar and linked to those of the main probes. In other words, using a single satellite it would have been impossible to say if a variation observed was caused by a change in time or a change in space.

When the project started in 1986, we had to overcome a lot of difficulties in Italy that were linked to political preconceptions. History has shown us that there was no foundation to these preconceptions and has also shown us the usefulness of the relationships set up through scientific collaboration. The mission has encountered great difficulties because of the dramatic historical events that have taken place in the eastern European countries. Nevertheless, the desire of our Russian colleagues at the IKI and the international effort and help (in fact France, Germany, Austria, Sweden, Canada, and Finland collaborated in the project as well as Poland, Czechoslovakia, and Hungary) have made this mission survive and remain the first scientific space mission of the new Russia. It is clear that there are still some difficulties, such as the fact that Baikonur is in Kazakhstan and that the main antenna for receiving data from the satellites is at Epatovia in the Crimea (Ukraine). But the bilateral agreements that are being negotiated or have already been signed will solve these problems.

It is important to remember that the Tail Probe will have a greatly elongated orbit around the earth (maximum distance 37 earth radii and every 4.4 days), with an orbital plane that is inclined 60 degrees on the elliptic plane. During the 4.4 days, the satellite will be in communication with the earth three times for a total of three hours. During the rest of the orbit the data will be stored on a magnetic tape that could be completely downloaded in half an hour sending the information to

earth. During the remaining 2.5 hours, the satellite will send a live, high-frequency transmission of the information collected.

The satellite is of the Prognost type, a type of satellite that has been very well-tested and has flown and functioned many times before. The body of the satellite comprises a cylinder with a 2-meter diameter to which four panels (that close up like petals during the launch) are attached. The panels are four meters long and are covered with solar cells. Arms carrying various kinds of sensors are mounted at the extremities of these panels (these are also closed during the launch). Two of these arms, each more than five meters long, carry the sensors for the OPERA experiment. When the satellite and the experiment are completely unfolded the maximum distance between our two sensors is a good 22 meters.

The Scientific Objectives

The scientific goal of the Interbol-type space missions, called magnetospheric missions (the ESA (European Space Agency) Cluster mission is also of this type), is that of understanding the variety of phenomena that occur in the magnetosphere as a result of the interaction of particle radiation emitted by the sun (the so-called solar wind) and the magnetic field of the earth. Because the various zones of the magnetosphere are connected to the earth by the lines of force of the magnetic field which become denser in the polar regions, it is in these areas that some of the more typical phenomena of the magnetosphere are better known, such as the boreal auroras, and the emission of radio disturbance, such as the famous whistler waves discovered long ago by Guglielmo Marconi.

The earth's magnetosphere is the home, therefore, of phenomena that are fundamentally important and are found in many astrophysical objects: shock waves (important in the molecular clouds for the formation of stars and the emission of infrared radiation), magnetic storms (that generate the high-intensity, high-frequency radio disturbance that also affects radar monitoring systems), acceleration of particles that have mechanisms similar to those required for the acceleration of cosmic rays, phenomena of reconversion of magnetic energy into kinetic energy, etc. The earth's magnetosphere is, in other words, a very rich and very complicated plasma physics laboratory that is easily accessible and also has noteworthy influence on the earth's environment. There are various ways of studying the plasma physics phenomena of the magnetosphere. It is possible to measure the distribution function of the velocity of the particles (protons or electrons, the ionic composition of the plasma, the magnetic field vector and the spontaneous electromagnetic oscillations of the plasma itself). Our OPERA experiment focuses on this latter type of measurement.

The OPERA Experiment

The OPERA experiment is an international project under Italian leadership. The LPCE of the CNRS

[National Center for Scientific Research] in Orleans (France), the ESA's SSD at ESTEC [European Space Research and Technology Center], and the group led by Professor Klimov at IKI participated in the production of the hardware. The writer [Prof. Vittorio Formisano] was responsible for the experiment until 1991 when it was taken over by his colleague Dr. E. Amata. Professor Klimov's team coordinates a group of experiments in which fluctuations in the density of the particles (IFPE experiment), and in the magnetic (MIF-M) and electrical fields (OPERA), are measured. OPERA is made up of three pairs of sensors and an electronic box. The three pairs of sensors form three dipoles measuring 22 meters, 4.4 meters and 4.4 meters respectively. The three dipoles are positioned on the arms of the satellite so that they are perpendicular to each other. Each sensor consists of a sphere that is isolated electrically from the rest of the satellite and attached by a titanium support. Since the sphere assumes the local potential of the plasma, the measurement of the difference in potential between two sensors gives the component of the electrical field along the axis of the dipole. OPERA therefore measures the three components of the electrical field E_x , E_y , and E_z . Both the DC [Direct Current] and AC [Alternating Current] of these components are measured. The DC part should identify the barriers of potential present in space, where there are discontinuities in the basic parameters (density, velocity, magnetic field etc.) With OPERA we have paid particular attention to the 0.2 - 32 Hz range of frequencies, because we think that the plasma waves in this frequency range, which are more electrical than magnetic, are those that dominate most of the phenomena of plasma physics in the earth's magnetosphere. The 0-0.2 Hz frequency range is covered by quasi-static measurements carried out every second (cyclotron waves.) The 0.2-32 Hz (lower hybrid frequency waves) range is also covered by calculating the spectrum of frequencies on board or by transmitting the wave form of the three components. For higher frequencies OPERA has two possibilities. A 24-channel filter bank supplies the power at up to about 200 KHz (kilometer auroral radiation and ionic acoustic waves); alternatively, by means of a filter which passes a range of 10-800 Hz it is possible to measure the wave form of the ionic-acoustic waves. The computer on board the experiment then allows a choice to be made between a maximum data production possibility of 3 Kbits per second (in one second all the measurements for all of the three dipoles are obtained), and a minimum (making averages and selecting only certain quantities) of 1 Kbit every 20 seconds. Finally, OPERA is an experiment that weighs little: each sensor weighs 270 grams while the electronic box weighs slightly more than two kilograms. It uses about six watts of energy. Interbol should supply data for at least a complete year. In the case of a longer life it could be linked to the European Cluster mission and could thereby incredibly increase the value of the information supplied.

Siemens, Ericsson to Upgrade Hungarian Telecom Networks

MI0906135393 Leinfelden-Echterdingen COMPUTER ZEITUNG in German 22 Apr 93 p 15

[Text] Over 2 million new telephone lines are to be installed in Hungary over the next four years, with over two-thirds supplied to private subscribers.

This expansion of the network was originally scheduled to take until the end of the decade. According to the Hungarian telecommunications company Matav, this recently agreed faster expansion will cost up to the equivalent of 6.5 billion German marks. Hungarian subsidiaries of Ericsson and Siemens are supplying the digital exchanges. Each company has been guaranteed 35 percent of the contracts, the remaining 30 percent being up for tender between them. From 1995, tenders for contracts to expand the network will be open to a wider range of suppliers, which is expected to include a joint venture by the manufacturer BHG, which is still state-owned, and Northern Telecom of Canada.

Croatia Buys Four-Party Digital Telecom Lines From Austria

MI0906130793 Eschborn NACHRICHTEN FUER AUSSENHANDEL in German 22 Apr 93 p 1

[Text] In Eastern Europe, where telephone lines are in short supply, Schrack Datacom of Austria is scoring a success with its PCM-4 system, which converts a single subscriber line into four party lines. Schrack Datacom has just received an order from the Croatian postal administration worth 30 million Austrian schillings. The company is supplying 3,000 PCM-4 links for 12,000 party lines.

The advantage of the system is that each circuit provides four subscribers with a complete individual telephone line. The equipment is connected to an analog exchange line, but provides digital switching to a maximum of four subscribers via a two-wire cable.

It has also been announced that the Viennese company is to supply several thousand systems to the Czech Republic, while it is tendering for a contract to supply a similar system to Poland. Some postal administrations in Hungary have already placed several small orders, while exploatory discussions are still taking place with Bulgaria.

Schrack Datacom is a subsidiary of Schrack Telecom of Vienna. The Swedish company Ericsson has a 50-percent stake in Schrack, 49.5 percent being owned by Austrian banks; the remaining shares are in various hands.

Audi To Build Engine Factory in Hungary

*MI1006145793 Eschborn NACHRICHTEN FUER
AUSSENHANDEL in German 22 Apr 93 p 8*

[Text] Audi AG of Ingolstadt has announced the signing of contracts to build a new engine factory in the Hungarian town of Gyor. Dr. Janos Miklos Latorcai, Hungary's Minister of Industry and Trade, has handed the government's statement to Audi chairman Franz-Josef Kurtuem, clearing the way for construction of the new factory, Audi announced on Wednesday.

This has involved establishing Audi Hungaria Motor Kft as a wholly-owned subsidiary. The company will initially produce around 1,000 components per day for new generations of engines on part of the former site of the Raba commercial vehicle factor, it was announced. The workforce will exceed 200 during the start-up phase, and the initial investment is quoted at around 300 million German marks [DM].

According to a report by the Hungarian news agency MTI, Audi is aiming at total investments of DM800 million, which it intends to achieve by 1998. During the first 10 years, Audi will benefit from the same substantial tax concessions previously granted to other automobile manufacturers. The Hungarian ministry expects the Audi/Raba collaboration to be a long-term one.

Western European Firms Modernize Bulgarian Telecom Networks

*MI0306082393 Eschborn NACHRICHTEN FUER
AUSSENHANDEL in German 27 Apr 93 p 28*

[Text] The contract to digitize Bulgaria's switching centers and international telephone links has been awarded to four Western companies: Siemens of Germany, the L.M. Ericsson Group of Sweden, Alcatel of France, and Northern Telecom of Canada.

It covers the first stage of the modernization of the Bulgarian telephone network, to include the installation by 1996 of 1,800 kilometers of fiber-optic cables, 1,200 kilometers of radio links, and 11 small switching centers.

The costs are estimated at \$230 million, 70 million of which will be contributed by the European Investment Bank, 32 million by the London-based Bank for Reconstruction and Development, and 20 million by the World Bank. The balance will have to be met by Bulgaria from its own resources.

Though Bulgaria's 2.5 million telephone lines for 8.5 million inhabitants represent a fairly dense telephone network for a former COMECON country, it was nevertheless neglected under the Communist regime.

UK Firm To Set Up Technology Hub in Czechoslovakia

*MI1406145293 Eschborn NACHRICHTEN FUER
AUSSENHANDEL in German 4 May 93 p 1*

[Text] The administration of the southern Czech city of Brno and the London-based British company, Bovis, have signed a contract to establish a technology park. The agreement provides for the city authority to contribute 9 hectares of real estate to the joint venture, while Bovis will invest a total of 18 million crowns.

Each partner will have a 50-percent stake in the new company, which in its final stage will employ a workforce of 2,500 on a site measuring 120 hectares.

The project leaders consider it important that the technology park should attract companies offering products and services able to compete in global markets. According to a spokesman for the city council, Japanese, Israeli, and Korean firms have already expressed strong interest in an involvement.

Brno Technical University, whose Engineering Faculty is located in the immediate vicinity of the site of the park, is taking a role in the project.

Expansion of German-Russian Research Cooperation

*93WS0458B Duesseldorf HANDELSBLATT in German
5 May 93 p 6*

[Article by hjs: "Bonn and Moscow Strive for Closer Cooperation in Research"]

[Text] The German research ship Polarstern will enter the Russian Arctic waters on an expedition. This was agreed during talks by the Deputy Minister for Science and Technical Policy of the Russian Federation, Kirill Yumayev, in Bonn. The talks were intended to expand German-Russian research cooperation.

The Polarstern is to undertake biological experiments during its voyage in the Russian Arctic waters. The trip which is to take place in the fall of 1993 will also include the participation of 60 Russian scientists. The Polarstern and the Russian research ship Dalnie Zelentsy have already undertaken one joint research voyage to the eastern Barents Sea.

The parliamentary undersecretary at the Research Ministry, Bernd Neumann, said after the talks with Yumayev in Bonn that additional scientific-technical cooperation between Germany and Russia plays an important role in stabilizing democracy in Russia. Furthermore, the present critical situation in Russia also harbors the danger that research establishments which are worth keeping might collapse. For that reason, according to information by Neumann, the Research Ministry is supplementing the traditional research cooperation with

guidance and support in establishing new research structures and in maintaining the highly capable research potential in Russia.

The Bonn ministry is making 20 million German marks [DM] available for special support measures within the framework of programs for specific fields. During 1993 a total of 50 projects from programs in specific fields funded by the Federal Research Ministry will be given more than DM30 million in cooperation with Russia.

The undersecretary in Bonn stressed that reactor safety research occupies a major portion of the scientific-technical cooperation. For example, a large computer facility has been made available to the Kurchatov Institute in Moscow for breakdown simulation. In addition, joint training courses are being held.

During the talks in Bonn, there was also mention of the level of preparations for founding an "international science and technology center" by Russia, the United States, Japan and the EC located in Moscow. Initially, \$75 million have been allocated for the center's work. The center has the task of creating new employment opportunities in the civilian field for scientists and engineers who until now were active in the armament sector. However, before it will be able to begin its activities the agreement must still be ratified by Russia. Minister Yumayev denies that conservative forces of the former Soviet military-technical complex are opposing the technology center supported by the West.

Russia To Sell 34 'Most Advanced Technologies' at UK Fair

BR2105142893 Rijswijk POLYTECHNISCH WEEKBLAD in Dutch 14 May 93 p 1

[Article by Cees van Zweeden: "Russia Puts Advanced Technologies Up for Sale"]

[Text] London—Russia is to put its most advanced technologies up for sale, revealed Yuriy Glybin, Russian secretary of state for defense, in London. The "sale of the century" will take place at a technology fair to be held in Birmingham from 24 to 27 May.

According to Glybin, all the technology to be offered at the fair was developed by the Russian defense and aerospace industries. The products, which have never been exhibited before, were made in industrial cities that were previously off-limits to westerners. The technologies on offer range from the latest satellites to artificial diamonds, the production of which is one of Russia's best kept secrets.

During a news conference held at the Russian Embassy in London, Glybin listed 34 different technologies that will be on display in Birmingham. "I could go on forever," he said. He emphasized, however, that no complete weapons system will be exhibited.

In Russia, the military-industrial sector provides jobs for 4 million people, said Glybin. Of this number, 800,000 work in research departments. The problem is, however, that the Russian Government has slashed the defense budget by 68 percent. As a result, hundreds of thousands of people are threatened with the loss of their jobs. "Some of the 200 or so companies in the military-industrial sector are very vulnerable and would not survive without Western customers," explained Glybin.

Super Jumbo

Glybin said that only 20 to 30 percent of the production capacity in the defense and aerospace industries is used directly for arms production. The rest is used to develop technologies that can have both military and civilian applications. According to Glybin, Russia is busy reconverting its enormous defense industry. Tank manufacturing plants have already been switched over to tractor production, and soon the aviation industry will be presenting a number of aircraft for civil aviation use. Ilyushin is to market a sort of super jumbo jet, the Il-104, which, says Glybin, can fly nonstop to practically any spot in the world, while Tupolev has plans to launch a new medium-range aircraft in the near future.

The Russians hope to do more than just sell their technology; they also hope to interest Western firms in joint ventures with their industries. Philips is said to have shown an interest in cooperating with a Russian company specializing in satellite technology, and the Russian aerospace industry won its first contract in late April to launch a Western satellite. The agreement between Inmarsat, a Western telecommunications satellite operator, and the Russian firm Salyut is worth some 65 million guilders.

Siemens Leads Telecom Upgrading Project in Poland

M11106103993 Eschborn NACHRICHTEN FUER AUSSENHANDEL in German 21 May 93 p 7

[Text] The largest modern telephone exchange in Poland to date went online in Warsaw in mid-May. It was supplied by Siemens, which was awarded the contract under an international invitation to tender by the World Bank. With an ultimate capacity of 36,000 subscriber lines, the exchange is one of the largest electronic systems of its type in Europe. It will improve long-distance communications both into and out of the country, and has cost 134 billion Polish zlotys.

Siemens has also won contracts to install telephone exchanges in other Polish cities. In the industrial area around Katowice in Upper Silesia, eight exchanges with a total of 225,000 subscriber lines are currently being installed, and others are planned in 12 more Polish cities. The total value of the contracts is around 72 million German marks [DM]. All exchanges are to be in operation no later than mid-1994, adding around 600,000 new lines to the Polish telephone network.

A large proportion of the equipment for the new exchanges will be supplied by the joint venture Cewis, established in 1990 by Siemens with the Warsaw company Zwut, which holds 51 percent of the stock. Zwut is the largest Polish manufacturer of communications systems. For almost a year, Cewis has been producing the EWSD automatic electronic exchange system for the Polish market, making it the only company in the country to produce digital telephone systems.

Privatization of telephone equipment manufacturers is planned. Siemens has stated that it was requested by the privatization ministry to take over, in addition to Zwut, the Elwro company of Wroclaw, which, according to Siemens, has nothing to do with this sector. A press release states that Elwro is involved in a joint venture with Canadian Northern Telecom.

Further contracts would depend on restructuring decisions. Cewis would be working to full capacity until the end of 1993. Since the order book for 1994 was still empty, the joint venture threatened to grind to a halt in the New Year.

Thomson-CSF Cooperates With Polish Radar Company

BR1406135893 Paris LA LETTRE DU GIFAS
in English 27 May 93 p 2

[Unattributed article: "Thomson-CSF: Cooperation Pact With the Polish Firm Radwar"]

[Text] On 7 May 1993, the Polish firm Radwar Warszawskie Zaklady Radiowe and Thomson-CSF signed a cooperation agreement under which IFF [identification friend/foe] equipment for the Polish armed forces will be assembled in Poland. The agreement is the result of negotiations between Thomson-CSF and representatives of the Polish Ministries of Defense and Industry. The aim is to supply Polish military forces with the equipment in the shortest possible time. Radwar, located in Warsaw, is a professional electronics group specialized in the design and fabrication of civil and military radars. It is a public enterprise recognized for its expertise and competence and operates four plants and one research institute. Radwar is a supplier for the Polish armed forces. This agreement comes under the cooperation policy between the Thomson group and Poland, with the creation in 1991 of the joint venture Thomson-Polkolor, between Thomson Consumer Electronics and the Polish firm Polkolor, which makes TV tubes.

Hungary Seeks Increased Role in EC Programs

BR0406151693 Amsterdam RESEARCH PLUS
RESULTS in Dutch May 93 pp 30-31

[Report on interview with Hungarian EUREKA coordinator Pal Koncs by Peter Olshoorn; date and place not given: "Paradox of Hungarian Technological Development: Western Money Needed To Prevent Emigration to the West"]

[Text] Membership in EUREKA [European Research Coordination Agency] and financial support from EC programs are of vital significance to the world of research in Hungary. Hungary would like to prevent the threatened departure abroad of its scientists, the "brain drain." They are being only partially successful as hundreds of researchers have already chosen to leave for better paying jobs in the West.

"The researcher does sometimes remain in his own country. He then begins to trade in footwear, or to program software on behalf of other companies, simply because of his lack of money. Sometimes that person drops out for good, sometimes only temporarily, but he will have then missed years of development in his field, which is also disastrous."

Brain Drain

Pal Koncs, national project coordinator for EUREKA and for the EC program COST [European Cooperation in the field of Scientific and Technical research], wants to make it very clear that Western collaboration and support for research is of vital importance. "The very existence of high-quality science is at stake. To keep ourselves at a high level, it is really not enough for Western firms just to establish themselves here. Their influence is not always positive. They bring products onto the market for which R&D in the West has been carried out and which is being continued there."

According to Koncs, contacts with foreign companies or institutes are indispensable for those involved in research, whether they come from the East or the West. He himself has worked as a nuclear physicist in the United States, Germany, and Russia. This career makes for an interesting and unusual life story, as is that of relatively many Hungarian researchers. The international outlook of the 10 million strong population is high. Contacts do not only result from traveling. Modern telecommunications are at the service of research. Proudly, Koncs tells of the surprise in the West at the modern computer network which Hungarian researchers use to connect to their database, Huntech. No fewer than 2,000 personal computers and terminals are connected to this network.

Put to Good Use

He and his colleague Zoltan Somogyi display an unremitting fervor about Hungarian participation in the EC COST program, and they are extensively involved with EUREKA. EC Commissioner Pandolfi's decision to increase the assistance being given to East European research from the initial ECU5 million (only for COST) to ECU55 million (to cover all research) is extremely welcome. Hungary is participating in 36 COST projects in which Western concerns and institutions are also taking part.

Koncs again: "We expect to be able to keep hold of at least 150 researchers as a result of our COST participation. We acknowledge that with relatively small amounts

of money good results can be obtained. Already a Marshall program is being talked of as necessary to put Eastern Europe back on its feet, but small-scale, specific programs seem to be able to produce huge successes. That is not to say that the assistance is sufficient, as the decline of the research institutes is continuing almost unabated, but we do want to demonstrate that the subsidies are being well spent here."

EUREKA

In 1992 Hungary became a fully-fledged member of EUREKA. Koncs sketched out the difficult path that Hungary has had to follow. Hungary has a big handicap which made entry difficult: "Thirty years ago research split off from industry and was brought into the academic world. As a result, the obligatory industrial participation in EUREKA was a problem. We are happy now to see that new, private companies are trying to take part in EUREKA." Making academic and commercial circles aware of the opportunities offered by EUREKA is now the most important task for the Budapest secretariat. The computer network is helping in this respect. Project descriptions find their way via tape and diskette from Brussels to Budapest, where the EUREKA Secretariat is being accommodated by the National Organization for Technological Development (OMFB). Hungary provides its participants in EUREKA with 25 percent of the project costs as a subsidy, and 25 percent as interest-free loans. The latter is of great benefit as the interest rate is over 20 percent. Hungary has a research budget of 12 billion Hungarian forints, which is roughly 250 million Dutch guilders. Koncs expects to be able to spend between 400,000 and 1 million guilders per [Hungarian] EUREKA project participant. Up till now, Hungarian participation has been approved or is going through the approval process in seven projects. EUROTRAC, with four participating institutions, is the most important project for the Hungarians. This project looks closely at the emission levels and environmental effects of different types of energy. In addition, Hungary wants to contribute to projects on laser research, automated software design, the fight against diabetes, and photonics applications.

Better Researchers

Koncs ventures to support the position that while the Communist system did indeed produce fewer research results, in many cases it produced better researchers: "The infrastructure and opportunities have been much weaker in the East than in the West. So, as still to be able to achieve international results, our researchers had to exert a far greater effort. When I wanted to know about something in the United States, I had every kind of database at my disposal. In the Soviet Union I had to look hard." That, according to Koncs, is the reason why scientists from the East have no problem in holding their own with the best of Western and Japanese researchers. He gives as an example Darmstadt center for research into heavy ions. Within a few years, the Russians had conquered the top positions there. Koncs says: "I do not

want to see a fight between East and West, nor a discussion about who is better, but to demonstrate that the movement of researchers between East and West is very beneficial to both sides. From the scientific point of view, a Europe without frontiers must be settled as completely and as quickly as possible. Much Hungarian know-how remains unused. New joint ventures should tap into much more research potential. I know for certain that the pay-off will be excellent...."

[Caption to photo, photo not reproduced] Hungary is taking part in the EUREKA "Stabine" project, which is developing an energy-efficient, medium-sized electricity plant.

EUROPE-ASIA RELATIONS

German Firm Builds Polymer Factory in China

MI0306082893 Eschborn NACHRICHTEN FUER AUSSENHANDEL in German 22 Apr 93 p 8

[Text] Zimmer AG of Frankfurt, which is part of the Lurgi Group, is to build a polyester polycondensation factory for Chinese synthetic fiber manufacturer Yizheng Joint Corp. of Chemical Fiber Industry, Yizheng. According to Zimmer's announcement, the factory will produce 200 tonnes per day of polymers and granulates, materials used for manufacturing polyester fibers. Zimmer is providing basic engineering and equipment, in addition to know-how and processes. The factory is intended to begin production at the end of 1995, and will be integrated into a complex of plants supplied by Zimmer during the 1980's under contracts worth around 400 million German marks.

Belgian High-Tech Firms Conclude Deals With Japanese Firms

93WS0448A Brussels KNACK in Dutch 28 Apr 93 pp 24, 27

[Article by Hubert van Humbeeck: "Time for Business"]

[Excerpts] "Kampai!" [Japanese toast] Baron Patrick Nothomb allows the word to resound loudly in the reception area full of atmosphere in the Belgian embassy in Tokyo. Our ambassador in the Japanese capital is aware of how it sounds. He raises the glass and allows the toast to be followed by loud applause. The rejoicing is sincere and the several dozens of people in attendance have happy smiles on their faces.

The ambassador has just cosigned as witness the agreement between Lernout and Hauspie Speech Products and Asahi Kasei Microsystems, a component of the giant Asahi Chemical Industry. Lernout and Hauspie is a young west Flemish small and medium enterprise [SME] that possesses something that the Japanese so far do not have: a computer technology that does all sorts of things with the human voice. For instance, someone gives an oral command to a computer that immediately executes it. Or, someone types a text on a keyboard, whereupon

the computer pronounces the text. Further, the computer compresses the length of a message spoken into it so that the chip on which the message is stored all at once becomes much less expensive and therefore can be manufactured more competitively.

For those of us who are technological laypersons, all of this seems like science fiction, but in fact this kind of high tech is very consumer oriented. Using this knowledge, for example, it is presently possible to replace the audio tape in a telephone answering machine with a built-in chip. Or in an automobile it is possible to make a call without lifting one's hands from the steering wheel. One simply gives the telephone a command to dial a certain number. In the burn trauma center in Neder-over-Heembeek all the individual rooms now are equipped with Lernout and Hauspie's technology. Severely burned individuals there are able to turn on the light, click on the television and select a channel or make a phone call with the sound of their voices. At present it is actually hardly possible to overlook the prospects of the system. To be sure, Asahi could develop the technology itself, but that would take three or four years and the agreement with the Flemish now offers them the possibility of considering immediately of starting product development.

Balance

Like Lernout and Hauspie on Thursday of last week, there were also several other Belgian companies that signed agreements with Japanese firms. Gnosis, a software company from Sint-Katelijne-Waver, concluded a profitable deal with the Fujitsu group. Gnosis specializes in establishing connections among different computer systems and already had an earlier success on the Japanese market.

Gamma of Liege, performing immunological research of considerable significance in the fight against certain types of cancer, was particularly honored by the presence of his imperial highness, Prince Hitachi, brother of Emperor Akihito, at the presentation of its know-how. All of the activities, it might be added, took place in the framework of a series of technological seminars that were conducted for three days in the Japanese capital by the Belgian Overseas Trade Service [BDBH], with Prince Albert in attendance. The specific aim of the organization was to show the Japanese business world that Belgium is more than a land of diamonds, carpets and soft-center chocolates.

Actually that is necessary too, since although the trade balance between Japan and the Belgian-Luxembourg Economic Union [BLEU] steadily declined between 1985 and 1990, it shot back up in 1991. For that reason the organization was particularly concerned with the mix of large and small companies that often could show highly valuable products in market segments in which Japan itself is not so proficient. Hence there was a conspicuous presence of mostly Flemish high-tech SMEs whose names are hardly familiar in their own country

since they naturally have quickly labored to export. The 23 participants held a total of 27 seminars attended altogether by upwards of 2000 Japanese specialists. [passage omitted]

The Lernout and Hauspie example is interesting insofar as the company, precisely two years ago, made its initial contacts with the Asahi group at an identical series of seminars. It demonstrates particularly well how cautious Japanese firms are in establishing contacts. The west Flemish were able personally to experience what professor Robert Ballon, a Belgian Jesuit, continually explains in detail to business people: that patience is the first requirement to reach an agreement with the Japanese. "They first want to get well-acquainted with you, and experience whether you have in-house quality and if you can continue to supply over the long term with the same preciseness," instructs Ballon who has now lived in the country 40 years and taught at the prestigious Sophia university. "Companies lacking a solid structure are for that very reason ruled out. It is just like in a marriage. The wedding day is preceded by a period of acquaintanceship and engagement during which the future partners experience whether they are likely to be able to get along well together. Whether they both will benefit from intertwining their lives. It is only after a period of two or three years that it is then possible to consider supply a sample of know-how. There is a well-known story of a firm that wanted to collaborate with Sony as a subcontractor. The contacts proceeded well and after two years of engagement Sony asked the firm to supply one shipment of three boxloads each containing 100 samples. The firm promptly got the three boxes back by return mail. To be sure, the first contained 100 samples, the second 98 and the third 104. The people at Sony determined that was not a fit basis for considering a continuation of contacts any longer."

Evaluation

That brings us back to our example. After two years of contacts and talks, Lernout and Hauspie reached a licensing agreement that only involved one of the applications that the company had in house and even at that not the most advanced. "Yes, they first want to see how it goes," say the west Flemish who still have an establishment in the U.S. Only after that is it possible to discuss including other applications in the license, with the prospect eventually of a genuine Flemish-Japanese joint venture. The BDBH urges Belgians who want a share of the Japanese market most of all not to think in terms of quick profits and sales. One person who has by now fully grasped that is Paul Buyse of Hanssen Transmission of Antwerp. Hanssen is a subsidiary of the English BTR group and has already actually been operating for 20 years in Japan. The company manufactures industrial drive systems—gear wheel casings used in ski lifts, for instance—and its products were marketed under license for the past 20 years in Japan by Sumitomo. It went so well that over the course of the years a hundred dozen of them were installed, a 50 percent market share. Hanssen has now severed the association with Sumitomo

and wants to go it alone in Japan. The company has prepared its gambit well. It is a company established under Japanese law, with a Japanese style of doing business. Market research has been performed and potential customers and users of Hanssen products have been meticulously kept abreast of the changing situation on a timely basis. And to top it all, last week in Tokyo the company unveiled its new machine delivering a performance 25 percent better than the earlier one.

Hanssen Transmissions' seminar drew nearly 200 interested parties, but Paul Buysse did not allow himself to get all worked up. He still refuses during the first two years to think in terms of sales and caught the Japanese press with that. "That is no idle talk," he said. "We want to be appreciated here first of all for our technology. That is, after all, precisely our strong point. We knew a recession was looming, but we will continue to invest in research. We have to have product development. Anyone not able to offer superior is out of the running. We have even had our new industrial drive system machine designated 'Axel Enthoven.'" Actually Hanssen Transmissions is aiming beyond the local market with its Japanese establishment. It can become a jumpoff point to other countries in the region where Japanese consortiums naturally have a solid footing. In fact one of the objectives of the mission on the whole was to get it across to Tokyo that Belgium is a strong enough partner for jointly undertaking projects in third countries. [passage omitted]

Volkswagen's Joint Venture in China Expands

93WS0454C Duesseldorf HANDELSBLATT in German
3 May 93 p 19

[Article by Peter Seidlitz: "The 'Middle Kingdom' Is Growth Market Number 1 for Wolfsburg"]

[Text] HANDELSBLATT, 2 May 93 SHANGHAI—Under its new chairman Piech, the Volkswagen Company will outline its future China strategy this week and discuss plans for a new automobile and engine plant in Shanghai. For VW, the new plants are a way of protecting its market share and automotive investment lead in China. Japanese and French automobile producers are now also concentrating on the Chinese market. Coming through the back door, U.S. and Japanese companies are preparing major joint ventures in the automotive supplies industry in China. In addition, the great numbers of automobile imports to China represent competition for the automobile industry established there.

In the face of this increasing competition, VW, as the largest joint German-Chinese enterprise, wants definitely to retain its 50 percent market share in China. Piech, together with a management team from Wolfsburg, will soon visit Peking, Shanghai, and Changchun.

Shanghai sources report that the Shanghai Volkswagen Automotive Co. Ltd. (SVA) joint venture has already set a production target of 100,000 (perhaps even 120,000) units for this year. In 1991, 35,000 Santanas were

produced; in 1992, 65,000 rolled off the lines. Beginning in June of this year, 360 vehicles will be produced daily in a six-day work week. To date, 280 units have been built per day. After the second Shanghai plant, currently under construction in Anting, goes into operation, VW production will reach its full capacity of 228,000 units, or 760 vehicles per day.

Notable Expansion of Capacity

On a still undetermined green field, either at the existing Anting site or in the Pudong special economic zone in Shanghai, a third, state-of-the-art automotive plant and a second engine-manufacturing plant, with an additional production capacity of 300,000 vehicles and engines, will be built. Negotiations are currently underway.

In addition to the Volkswagen-Shanghai production capability of 528,000 units, there is also the capacity of the VW joint venture in Changchun in northern China, where the First Automobile Works (FAW) has set a production target of 150,000 Jettas and 60,000 Audis yearly. By the mid 1990s, Audi production is expected to triple the current output. Moreover, Volkswagen has a panel truck (van) plant in Taiwan, which plans to produce 30,000 vehicles by 1995.

Japanese Automobile Producers Move In on the Market

Stefan Messmann and Bernd E. Farny, German members of the SVW management team, told HANDELSBLATT in Shanghai that the expansion of the second automotive plant and the first engine plant in Anting has been financed by SVW's own resources. The Shanghai joint venture has systematically put aside surpluses for investment, so that the initial capital of 350 million renminbi [Chinese currency] has now grown to 1.2 billion. In the event the green light is given for a third Shanghai plant, SVW could itself obtain the money in the capital market or in the Shanghai stock market. SVW approved its first dividend distribution in 1992.

VM has been prompted to further action in China not just because of the surprisingly increased need to expand production, but also because of China's importation of Japanese automobiles and joint ventures by French, American, and Japanese automobile producers and automotive suppliers.

Thus, for example, Suzuki Motor Corp. Japan (in which General Motors holds a 3.5 percent share), together with its Japanese partner Nissho Iwai Co., are investing \$170 million in a joint venture with the Changan Automobile Corp. (an affiliate of the Chinese NORENCO armaments company) and, commencing in 1995, will be producing about 20,000 units of the older Alto model. By 1996, about 50,000 such vehicles will be produced. The plant is being built in Chongqing in Szechwan Province, where Suzuki already operates a motorcycle joint venture with a production target of 100,000 units. Suzuki plans to establish three more motorcycle plants.

In Tianjin, a Daihatsu-Chinese joint enterprise already produces 50,000 small vehicles, which were sold very rapidly in all the major cities of China as taxis. Nissan is venturing a production facility to enter the larger vehicle market in China; and a Chinese group, Nanfang Automobile Group, is planning to build an automobile in Guangdong.

A plant, whose target production figure is 300,000 Citroens, is being built in Wuhan, China's Chicago. Peugeot is engaged in a joint venture in Guangzhou, where the production target for 1993 is 20,000 units. U.S. producers, who already operate the Beijing Jeep Plant (the 1993 target is 30,000 Cherokees), are following the Japanese strategy of entering the Chinese market by the back door, which is to say, by establishing automotive supplies industries. The Ford Corp., in a joint venture with the Shanghai Automotive Industry Corp., is building two automotive supplies plants.

A German manager noted that the Japanese have used different tactics in China than the Germans: "While we planned to meet Japanese competition by operating from a Chinese base, the Japanese wanted to prevent competition arising in China that might threaten their automobile industry."

Greater Role for China in the VW Production Association

SVW's Messmann asserts that the German automotive supplies industry, which for years has been prompted by SVW to get engaged in China, is—in the opinion of the Shanghai VW management team—missing, or indeed has already missed, a good opportunity. Thus, for example, China has turned to a U.S. producer for injection pumps because Bosch, Germany's largest supplier, delayed too long in following VW to Shanghai. They were simply not sold on China.

The production facilities in China will play an increasingly important role in VW's global operations. About 80 percent of the parts for the Santana are already being made in China, including rear axels, drives, engines, and stamped parts. SVW is particularly proud of the car's high quality and the already existing professional customer service network, consisting to date of 180 repair shops.

A complaint heard in Peking and Shanghai is that, unlike the Japanese companies, VW and the other German producers, with the exception of Mercedes Benz, lack flexibility in the selling and marketing vehicles not produced in China. An enormous number of cars are exported to China through Hong Kong companies and other channels. VW has ignored this market.

Great hopes are now being put on Martin Posth, the new head of Asia/Pacific operations. Posth, the first sales director and later personnel director at SVW, is expected to take new initiatives. He will establish a VW regional headquarters in either Peking, Tokyo, or Hongkong.

The state-determined sales price might constitute a handicap for VW. A made-in-China Volkswagen simply costs too much. Actual costs for a Santana is 55,000 German marks [DM]. The automotive supplies industry is rapidly shaping up in China.

With its production expansion, VW has had problems with the inflation in China. SVW wages rose 20 percent in 1992, and in this year have already risen another 25 percent. SVW plants operate 46 hours a week, five days a week. The average wage is 600 renminbi or DM171 a month; supplemental costs add another 40 percent. SVW employs 6,130 workers in its three plants. There are only 28 Germans employed in key management and production positions.

It is now a matter of cost as to whether the new plant will be built on the green field in the Pudong special economic zone or on the premises of the existing plant in Anting. Real estate prices have tripled in Pudong in the last two years. As compensation, companies that establish themselves there enjoy certain tax privileges.

Philips Enters Cordless Telephone Venture in China

M11406142793 Eschborn NACHRICHTEN FUER AUSSENHANDEL in German 4 May 93 p 8

[Text] The Fourth Research Institute of the Chinese Ministry of Posts and Telecommunications (MPT), Philips and Grundig Radio (PGF) of Nuremberg, and Philips Semiconductors' Zurich subsidiary, Faselco, have established a joint development center for cordless telephones in Xian. Each of the three partners has a one-third holding in the joint venture. PGF is contributing its experience with cordless phones, while Faselco is supplying integrated circuits know-how, states PGF. The development center will be known as Philips CT Development Center Xian, China.

The purpose of the joint venture is stated to be the development of cordless telephones according to analog and digital standards, such as DECT (Digital European Cordless Telecommunication). According to a company spokesman, the integrated circuits used will be based on Philips Semiconductors components. The development of cordless phones also includes the requisite software, printed circuit boards, housings, and the design of special components up to the preproduction stage. The sets will actually be manufactured by Chinese firms, using the know-how supplied and technology transferred. The chairman of Philips CT Development Center Xian is Gerd W. Grabowski, PGF managing director and board spokesman. The Development Center's general manager is Dr. Li Shi He, president of the MPT's Fourth Research Institute.

Philips expects this technology transfer to China to lead to "a lasting opening and expansion of [its] Chinese markets." In particular, the introduction of equipment based on the DECT standard could mean analog equipment being followed by digital technology. According to

PGF, the Chinese Ministry of Posts and Telecommunications has initiated general restructuring measures in this connection, entailing an increase in investment to 16.5 billion German marks [DM] in 1995, rising further to DM40.5 billion by the turn of the century.

Italy: SGS-Thomson Increases Production Capacity in Malaysia

MI0406120493 Milan *ITALIA OGGI* in Italian
5 May 93 p 10

[Text] In the middle of the Malaysian jungle, three hours by dirt track from the capital Kuala Lumpur, stands Muar. This is the spot chosen by SGS-Thomson for its latest investment. The chip manufacturer, which ranks 13th in the world, has decided to increase the production capacity of this plant, which employs 3,000 people, by a third. An expansion project worth several tens of millions of dollars is being launched and will be completed by the end of the year. This represents a complete turnaround: after having closed down seven out of 22 production units over the past five years, the French-Italian group is now forced to expand its plants. The question to be asked now is whether the group's plant in the United States (Phoenix, Arizona) will have the chance to be resurrected. The reason for this sudden euphoria? The upturn in the world semiconductors market, estimated to be worth \$70 billion. After three bleak years, the chip race has started up again. World sales should rise by 17 percent this year against 9.6 percent in 1992, and could exceed the 20 percent mark in 1994. The rise is so sharp that the prices of electronic memories are red hot and delivery times longer. This is a totally unexpected opportunity for manufacturers to fill their kitties. There is no time to be lost however as "the spin-off" is forecast for 1995, according to the industry's cycles. At present everybody is cashing in: The American company Texas Instruments has just doubled its quarterly profits to \$85 million and admits that its orders "have hit an all-time high." Its industrial counterpart, Motorola, fourth in the world ranking, is just as ebullient, with profits increasing by 43.6 percent to \$181 million in the last quarter. However the honors once again go to Intel, the microprocessor specialist, which last year jumped to first place in the world in the sector. The Santa Clara company has seen its net quarterly profits grow to almost 200 percent to reach \$548 million (against revenues of 2 billion). The explosion in sales of PC's, now sold at "bargain" prices, has made a big contribution. Like its rivals, SGS-Thomson this year recapitalized to \$500 million and is enjoying the better times. At the rate things are going its growth should exceed 20 percent this year.

The company, with President Pasquale Pistonio, and which last year declared its first net profits since 1989 (\$3 million against revenues of \$1.6 billion) expects "a highly satisfactory year" in 1993. This is especially true for Asia, where orders recorded in the first three months have increased by almost 30 percent. A pleasant surprise

for its two new shareholders, France Telecom and Cea-Industrie. Although it is too early to say whether the group will make up ground in the world ranking, it will probably use its global market share approach around 3 percent compared to 2.6 percent in 1992.

A capital indicator given that the survival threshold in the industry is set at 5 percent. In any case Pasquale Pistonio has promised that this will be achieved by the end of the decade.

SGS-Thomson, Mitsubishi To Cooperate in Flash Memories

BR0706140393 Paris *ELECTRONIQUE INTERNATIONAL* HEBDO in French 13 May 93 pp 3, 6

[Article by Francoise Grosvalet: "Flash Memories: SGS-Thomson/Mitsubishi Alliance"]

[Text] The two companies have joined forces to develop a range of 16-Mbit (and more) flash memories using 0.5-micron CMOS [complementary metal-oxide semiconductor] technology.

After Intel and Sharp, AMD and Fujitsu, and Toshiba and National Semiconductor (and Samsung), it is now the turn of SGS-Thomson and Mitsubishi to sign an agreement to develop and produce the flash memories of the future. Sales of these non-volatile memories are set to rise faster than those of any other type of memory. The agreement, which was announced on 12 May, provides for the joint development by the two companies of a series of 16-Mbit (and more) flash memories using 0.5-micron CMOS technology. It also involves the reciprocal manufacture of 16-Mbit flash memories, the models which Dataquest says will represent 25 percent of the flash memory market by 1996. At the time this article was going to press, it was uncertain whether these 16-Mbit flash memories would be the ones jointly developed by both companies or whether they would be individually produced.

It is worth noting that both SGS-Thomson and Mitsubishi have used the NOR type of memory cell architecture which is currently the industry standard. Commenting on the agreement, Yuko Shinryo, managing director of Mitsubishi Electric's Electronic Components Division, said: "Mitsubishi will be in a position to import flash memories made in Europe, which will boost imports of foreign products into Japan."

We should not forget that Mitsubishi as yet has no distribution centers in Europe. From there, it is only a small step to the idea of the 16-Mbit memories being manufactured by SGS-Thomson. In the words of Ennio Filaurio, vice president and director of the SGS-Thomson memories group, "this agreement rounds off the work we have already done, both individually and as part of the JESSI [Joint European Submicron Silicon Initiative] program. It will enable us to continue to do what we need to in order to stay at the forefront of

traditional non-volatile memory technology (SGS-Thomson is the world's number three in EPROM [erasable programmable read-only memory] technology, at the same level of technological development as companies further ahead in this field) and, at the same time, make a significant contribution to the progress achieved in the crucial flash memory sector."

The main focus of the agreement is the production of flash memories for the mass storage market (in other words, for solid-state hard disks), but the memories

developed by the two companies will also be suitable for use in a wide variety of other applications, especially radio communications.

The SGS-Thomson/Mitsubishi alliance is well-balanced since both companies are at about the same level of development in this field. In fact, both companies have just introduced 1-Mbit models for mass production and are sampling (or are about to sample) 4-Mbit models. As a result, both state that "each party is responsible for the costs incurred by this agreement and no financial compensation will be made by either company."

Current Availability of Flash Memories

| Suppliers | 1-Mbit | 2-Mbit | 4-Mbit | 8-Mbit | 16-Mbit | Comments |
|-------------------|--------|--------|-------------|-----------|---------|---|
| AMD | Prod. | Prod. | - | Devel. | Devel. | 8- and 16-Mbit models developed with Fujitsu |
| ATMEL | Prod. | - | Sam. | - | - | single power supply devices |
| Catalyst | Prod. | Sam. | Devel. | - | - | Agreement with OKI for producing 4-Mbits and over |
| Fujitsu | - | - | - | Devel. | Devel. | Agreement with AMD |
| Hitachi | Prod. | - | Samp. | - | Devel. | |
| Intel | Prod. | Prod. | Ltd prod. | Ltd prod. | Devel. | Agreement with Sharp |
| Mitsubishi | Prod. | - | Samp. | - | Devel. | |
| NEC | - | - | Pilot prod. | - | Devel. | 16-Mbit sample late 93 |
| Samsung | Prod. | - | - | - | - | Agreement with Toshiba |
| SGS-Thomson | Prod. | Devel. | Devel. | Devel. | Devel. | 4-Mbit samples planned for mid-1993 |
| Texas Instruments | Prod. | - | - | - | - | |
| Toshiba | - | - | Pilot prod. | - | Devel. | Agreement with Samsung and National Semiconductor |

No companies are yet capable of mass producing flash memories over 2 Mbits. This market shortage looks set to last at least until the end of the year.

(source: ELECTRONIQUE INTERNATIONAL HEBDO and manufacturers)

SGS-Thomson-Mitsubishi Flash Memory Venture Outlined

BR0806143893 Paris *ELECTRONIQUE INTERNATIONAL HEBDO* in French 20 May 93 p 14

[Article by Francoise Grosvalet: "SGS Thomson Describes Agreement With Mitsubishi]

[Text] The agreement signed last week covers the joint development of a complete range of 16-Mbit flash memories for various applications. The memories will be manufactured and marketed independently by the two partners.

The main reason for the agreement signed last week between SGS-Thomson and Mitsubishi in the field of flash memories is, according to Piero Martinotti, vice president in charge of strategic planning at SGS-Thomson, "to be able to market a complete range of 16-Mbit flash memories for various applications in a short period of time." "First," explains Martinotti, "the two companies will define the products to be developed jointly depending on the needs expressed by their respective customers."

During the next phase, to be carried out at the same time, the companies will exchange technological information intended to achieve compatibility of the independently

developed processes. "It is a question of giving users a genuine alternative supplier," says Martinotti. "However," he adds, "the agreement does not provide for any technological development: We have our technology, and Mitsubishi has theirs." After these two phases, work will begin on developing the memories themselves. "We have not yet clearly defined how we are going to share the work between the two companies," says Martinotti, "but it is clear that once the basic structure is defined, each company will specialize in the development of one kind of memory rather than another. After all, both SGS-Thomson and Mitsubishi have the capability to manufacture the whole range." The agreement also provides for the reciprocal manufacturing of 16-Mbit memories. "In other words," says Martinotti, "since the masks will be the same, and the technologies will be compatible, it is possible to imagine SGS-Thomson manufacturing certain types of flash memories for Mitsubishi and vice versa, at certain times, and under certain, very precise conditions."

SGS-Thomson, Sanyo Video Decoder Agreement

BR2906100293 Paris *ELECTRONIQUE*

INTERNATIONAL HEBDO in French 17 Jun 93 p 20

[Article by Francoise Grosvalet: "Only \$30 for Audio and Video Decompression"]

[Text] Thanks to an agreement with Sanyo, SGS-Thomson is the first company to market an economical, complete, two-circuit solution for MPEG [Motion Pictures Expert Group] video and audio decompression.

SGS-Thomson has just introduced a video decompression circuit integrating all the functions necessary for MPEG and H.261 video standards processing on a single chip. (The CCITT H.261 standard is optimized to transmit video information on low speed channels at a speed of $p \times 64$ Kbit/s. It defines two image formats: CIF at 352×288 pixels and QCIF at 176×144 pixels. MPEG is optimized for better quality and greater speed (1 Mbit/s and more), with a variable sized image.)

For audio processing, the company—which is developing its own circuit along the same lines as TI, i.e., based on a digital signal processor—has signed an agreement with Sanyo (see box 1). The agreement will permit the company to offer the cheapest two-circuit solution on the market (approximately \$30: \$20 for the video decoder and \$10 for the audio decoder). The French-Italian company will also be the first to introduce a decoder compatible with the future MPEG-2 standard (see box 2), and therefore adapted to digital broadcasting applications. It is also preparing two circuits intended not for decompression but for real-time video compression. The circuits, which are scheduled to be ready for sampling by the end of the year, will be based on the same economical approach and be fully compatible with the MPEG and H.261 standards.

Target: Consumer Market

With the announcement of these circuits, SGS-Thomson is proving that it has decided to aim at the consumer multimedia applications market, whose principal sales criterion is price. The first market targeted will be CD-type CD-I videos, games, karaoke, etc., a market located principally in Japan, where SGS-Thomson can boast of a certain amount of success. The second market targeted will be digital cable TV, both land-based and by satellite. This is the field covered by MPEG-2, although the first applications will start up under MPEG-1. The third market will be videophones for the consumer market, at a somewhat later date. There is therefore no question of developing a universal circuit adapted to all standards. "Total programmability is potentially the most flexible solution, but may be costly in terms of chip surface area and energy consumption," says Guy Lauvergeon, SGS-Thomson director for image processing. "Nonetheless," he adds, "a completely hardware-based solution, although quite efficient in terms of energy consumption and chip surface area, lacks flexibility. We have therefore chosen a mixed approach, with hardware elements and sufficient programmability to accommodate a broad range of applications." SGS-Thomson has finally decided to integrate into the silicon all the functions that are well defined by standards, such as discrete cosine transformation (DCT), quantification, variable length coding, and movement compensation and estimation, while all functions requiring a certain flexibility are handled by the software, as long as there is no real time restriction. All hardware functions are defined by blocks to permit the rapid development of upgrades.

Thus, no more than two months of development were needed to upgrade from the STi3240 video decoder, introduced one year ago, to the STi3400 which has just been introduced. The latter circuit combines all the STi3240 functions on a single chip, as well as the inverse DCT unit and a number of additional features intended to make it easier to use. In particular, these features include a serial input gate for compressed data and a vertical chrominance filter. A complete video decoder can be created by adding slow DRAM's [dynamic random-access memories] (minimum 4 Mbits, maximum 32 Mbits) and a microcontroller which is only utilized at 1 percent. The STi3400 is MPEG/H.261 compatible with CIF resolution. Thanks to the display controller integrated onto the chip, it features a programmable display. Based on 0.7-micron technology, the STi3400 integrates approximately 300,000 transistors onto a single 80-square-millimeter chip. It comes in a 120-pin PQFP [quad flat pack] and is expected to be sold for less than \$20, with predictions that the price will drop by 50 percent within two years. Changing over to 0.5 micron CMOS [complementary metal-oxide semiconductor] technology, scheduled for production at Crolles in the near future, will reduce the size of the chip to 45 square millimeters, thereby enabling the integration of audio and video decoders on a single chip.

The SGS-Thomson real-time video compression solution consists of three circuits: the STi3220 movement estimation processor introduced two years ago, a STi3223 movement estimation controller, and the STi3230 coder. The coder can be utilized by itself for low-level compression, since the movement compensation provides a better quality image.

[Box 1]

The Sanyo Agreement: More Than Just MPEG Video Applications

The agreement signed on 14 June between SGS-Thomson and Sanyo covers the development and marketing of integrated circuits intended for MPEG/CD-I and fax/modem applications. According to the terms of the agreement, each company will develop circuits based on its own know-how, but will market the circuits developed by its partner, so as to supply complete solutions in kit form. Mixed designer teams from Sanyo and SGS-Thomson will define the interface specifications and other standards necessary for coherent kit design. The first example of this cooperation is the set of CD-I circuits which includes the STi3400 video decoder by SGS-Thomson and the MPEG LC8230 and LC8954/8957 by Sanyo. The latter integrates all the other functions necessary for a CD-I reader.

A similar development project is under way for 14,400 bit/s fax/modems, with Sanyo contributing its fax integrated circuit skills and SGS-Thomson contributing the modem circuit know-how. [End box 1]

[Box 2]

The First MPEG-2-Compatible Video Decoder

The STi3500 is an extension of the STi3400 video decoder architecture intended for the digital television market. It is based on the MPEG-2 video standard (as far as the latest known specifications are concerned) at speeds defined by the CCIR 601 standard: 720 pixels per line with 480 lines in 60-Hz interlaced mode, or 720 pixels per line with 576 lines in 50-Hz interlaced mode. As with the STi3400 circuit, the only other components required for a complete system decoder are an 8-bit microprocessor and a DRAM memory. The MPEG decoder actually integrates all the functions necessary for real-time image decompression: inverse DCT, inverse quantification, variable length decoding, and block reconstruction. It also includes a local memory controller, an 8/16 bits microprocessor interface, and a display unit with the possibility of programming the display format in 4/3 or 16/9.

The STi3500 will be distributed in sample form in July. "Just in time," says G. Lauvergeon, "to begin the first commercial applications, scheduled for 1994." [End box 2]

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